Evolution of the Urban Form of Historic Hit Citadel: Deriving a Schematic Model for Iraqi Fortified Cities

Lina Raad Mohammed¹ and Dhirgham Alobaydi²

¹,²Department of Architecture Engineering, College of Engineering, University of Baghdad, Iraq. E-mail: ¹lina.raad955@gmail.com ; ²dalobaydi@gmail.com

Abstract. Hit Citadel is a historic fortress that has witnessed a distinctive urban development. Like many old citadels in the Middle East, the basic features are included, but not limited to, a fort with an organic zigzag street network, a scattered distribution of open spaces, a compact built-up area, a recognized socio-commercial form, and a peripheral area of military and industrial uses. The evolution of these features was constant and survived largely intact until the early of the 20th century when modern planning practices were adopted in the site. The citadel form thus, has influenced by two types of urban growth: organic and planned. Taking this distinction as a start point, this paper investigates the development of Historic Hit Citadel and seeks to answer the question of; how this urban form was evolved. The main purpose of this paper is to derive a schematic model that represents the Iraqi fortresses. Morphological methods were used to study the patterns of growth formations and transformations. Results have shown that the deriving model is describing the character of Hit Citadel; however, further efforts need to be spent in effective comparisons with the other Iraqi fortresses for the sake of robust results and representativeness.

1. Introduction

Over many centuries, fortified cities including the citadel, high towers, big walls, gates, and ditches were built to have the best protection against any invader. The majority of this type of cities was formed on the sea coasts, mountain edges, or over the hills. Historic Hit Citadel (HHC) is not an exception. It was built over a hill and lies northwest of Ramadi, the provincial capital, on the Euphrates River [1], see Figure 1. The HHC is a small walled city formed on two mounds on the site of the ancient city of Is. Historically, the HHC was known for its “bitumen wells”, used as far back as 3000 years ago. The bitumen was used to build many parts of the famous City of Babylon and also for caulking boats. Later, it became a frontier fortress for Assyria. The city was under the Islamic rule in 16th Century Hijri. It is currently occupied by a local becoming a marketplace and oil pipelines to the Mediterranean Sea cross the Euphrates there.

The HHC form seems as an irregular oval an ellipse. It was surrounded by a halt moat. The moat was always filled by water for security purposes. Its two edges were ended by the river. Next to the moat, the high walls were built with two main gates. In addition, there was a set of moving bridges set to help pedestrians to cross the moat. The two gates were resisting many morphological changes occurred during the times of invasion, see Figure 2. In the last decades, sadly, the historic arcs of the gates were deteriorated and many other parts were missed.
HHC is a distinctive form because it has architectural elements of conventional city fortifications with important historic urban features, which were influenced by a nexus of old civilizations (Babylon and Assyrian), Islamic era, and modern planning practices. These urban features have produced a unique combination that is rarely formed in the other similar Iraqi cities.

During the totalitarian control of Ottoman Empire, HHC suffered from heavy losses when many urban parts were destroyed several times by the wars and fights, occurred under the rule of invaders. After establishing a national state in Iraq in the 1920s, the HHC was abandoned, but the surrounded urban areas were settled [1, 2, 3]. The status of deterioration was never ended, as shown in see Figure 3. However, the HHC began to live a new life – when it was nominated under the UNESCO world heritage site list in the early of 2019. Although this nomination has stopped further deterioration, removal of materials, and opening modern ways, development the heritage of HHC is still problematic since there is no a schematic reference by which one can rely on to develop the existing Iraqi citadels, see Figure 4.

Many researchers have conducted important studies addressing the fortified towns and citadels', with or without relation to the urban areas. These studies were reported in the previous studies section [2-7]. Kosambi and Brush have analysed the three Colonial port cities in India. The analysis followed a morphological approach studied the physical, spatial, and social forms in order to drive a model from such type of cities [8]. Sabr studied the basic urban elements using the morphology measures to analyse and describe the evolution of Erbil Citadel in Kurdistan Region in Iraq; the study concluded a set of urban and planning regulations aimed at enhancing the current conditions of the citadel [9]. Al-Jameel has studied the syntactic properties of spatial structures on the basis of using space syntax.
analysis. The integration measure was employed to describe the most integrated paths in the citadel [10]. Other researchers have addressed relevant topics including the formation and transformation of the HHC form, development of land use, architectural elements, and renewal projects. Even though, the existing aforementioned studies have been conducted regarding the evolution of historic citadels (within an urban environment) and covered important samples, studying the morphology of this type of cities still demands observation. Moreover, idealized guidelines that applied to improve the existing conditions of such cities are still lacking in the literature of the Middle East region. In this paper, the evolution process (formation and transformation) of the HHC is dedicated for study purposes and helped to outline some guidelines to improve the existing conditions.

Figure 3. Samples of the Deteriorated Parts inside the Historic Hit Citadel (authors)

The importance of this paper comes from studying the significance of the morphological features of Hit Citadel site. Long did the process of determining the value of the conservative features of the whole urban form, and that process is still going on the research, although in the meantime the HHC (together with a surrounded area) has been declared a cultural and historic unity of great significance for the Ramadi Province and Iraq. The objectives of the paper therefore can be outlined as:

1) Proposing a schematic model for the HHC representing the Iraqi fortified cities.
2) Drawing a set of guidelines for protecting the existing historic site.
3) Promoting the unique sociocultural values that the HHC and its surrounding areas have.

Figure 4. Existing Urban Form of HHC
The paper is set across three main phases. First, the topics have described and introduced. Then, the methods employed to understand the HHC evolution. Finally, the results have discussed, and the guidelines have outlined.

2. Urban Morphology
Urban morphology simply is the study of a city form as the result of historical developments and constraints, each clearly identifiable in intentions and physical results [11]. Historically, there are three distinctive schools of thought which are Muratorian, Conzenian, and Versailles founded to study, analyze, and describe the urban morphology. The main goal of these schools is to understand the emergence and evolution of the urban form patterns and also to explore its important transformations over time [12]. Muratorian School emerged from the thoughts and works of the Italian architect Saverio Muratori in the 1940’s. Then, a new approach of thought and practice was developed by Conzen in the early periods of the 1960. Finally, in the late 1960’s, a French School was drawn its path between the two former schools [13]. Although these approaches were emerged from three different European schools and covered by a worldwide literature on the aspects of urban form, there were many mixed approaches emerged to study some special cases in Europe, North America, Middle East, and Asia.

Conzen's morphological analysis has demonstrated the urban form structures on three levels. The first level studied the town plan including comprising streets, plots and buildings); the second level was the building fabric; the last level focused on analyzing the land and building utilisation. Conzen has developed the process of urban development established a school of thought that was founded in his work [11, 13]. Conzen's morphological approach is very important since it constantly examines the transitional phases, which are in a never-ending process of development, of the urban form itself. Although it was started by studies of geographers, it is considered as a multidisciplinary field of study as architects, urbanists, and planners have contributed to the studies of urban forms and structures. His morphology measures focus on analyzing and describing the physical layouts of the two-dimensional cartographic representation of the town plan.

Authors have adopted Conzen’s first level that studies the town plan. A town plan analysis is widely used to identify three fundamental urban elements of the town plan: streets, plots, and buildings [11, 12]. According to Conzen, these three urban elements should be considered as the basic units of the town plan; therefore, they should be analyzed and described over time in an evolutionary manner to understand the growth patterns. The evolutionary approach of Conzen was chosen for this paper, but only streets, plots, and buildings (including their utilization) were studied, as shown in Figure 5.

3. Methods
A morphological approach, focused on analyzing both the spatial structures and functional systems, has been adopted to study the evolution of the HHC. This paper addresses issues and topics of formation and the transformation of main urban features of the HHC and links these to the influencing factors. The analysis has dealt with studying the patterns of three urban variables, streets, plots, and
buildings that change over time. For this time, the walled area of HHC will be studied since it has the historic citadel, the residential clusters, the mixed and commercial parts, and the spatial network.

The morphological analysis carried out in this paper was performed in three main phases: (1) data collection, (2) data digitization, and (3) data analysis. In the first phase, the available data will be gathering and classifying information on studied variables in a determined system. In the second phase, physical data including maps, photos, and manual records were cleaned and converted into digitizing data, being ready for processing and analysis. In the last phase, digitizing data were evaluated based on the adopted morphological approach to discovery relevant issues and topics related to the three studied variables of HHC urban form. These phases are useful to answer the main question of this paper and evaluate the results. So, the phases are described in details in the next.

3.1. Data Collection

All available data including written manuscripts and reports, maps, photographs, aerial and satellite images of the HHC were collected and arranged on the basis of the historic evolution. The majority of the historic maps were drawn by Western geographers and planners, during, and after WWI. These maps were based on their observations. In addition, there were few aerial photos used for integrating the information of the studied maps. Since HHC destroyed multiple times, many organic historic fabrics were entirely removed according to actions; however, few historical maps and photos were available. Therefore, authors have used some maps based on the historic maps, documents, manuscripts, stories, and sketches; this led to build a comprehensive map for the HHC.

The comprehensive map was used the reliable data, Iraqi certified documents, and included the three urban form layers: streets, plots, and buildings that needed to contain the required information, the drawing scale, and the symbols legend. In addition, the layer of buildings was considered the land uses and how they distributed. For this phase, three main historical developments of HHC were recognized: formation, modernization, and post-modernization.

3.1.1. Formation. The first phase was represented by the origins of the urban form in 1918. This phase was considered to be the formative phase of HHC. During this time, urban infills were generated within the existing city walls and few structures settled out of the walls in the surrounding areas. Then, many urban subdivisions were implemented on undeveloped lands within the existing city walls and the city become dense.

3.1.2. Modernization. After fall of Ottoman Empire, the influences of automobiles and modern planning practices were arrived with the British Colonial Power to Iraq in 1918. Despite of who was started first, with undetermined information, the influences of automobile planning practices on the HHC form were impacted the old organic zigzag streets. Wide roads were built and some old streets were widened as well. Concrete building forms were inserted inside the compacted historic residential clusters. Another recognized modern feature was a wide road which was built in aligned path of the city old wall, from the southwest and runs towards the northwest. In Iraq, many of ancient cities were impacted environmentally when modern planning practices were applied [14].

3.1.3. Post-modern. This phase is the last study phase here and thus spans the period from 1960s up to present time. Ignoring the historic site and its nearby areas was the main feature after the 1960s. The conditions of the landscape and urban forms were deteriorated by the unsafe environment. This was originated to social upheaval when out-laws and criminals took over control on cities streets after 2003. However, a remarkable change was occurred when the HHC was nominated by UNESCO for being listed in the conservative historical sites.

3.2. Data Digitization

The process of digitizing the studied data was conducted using ArcGIS (ArcMap 10.1 software) in three main steps. Due to the cartographic differences among the scanned photos, aerial and satellite image, a georeferencing process was initially applied. Here, recognized existing landmarks (the citadel, the historic miharaite, and one of the historic gates) that have not changed or spatially firmed
were used. These landmarks were useful to overlay spatial locations of the modern satellite image that was used as the base map in this study. Next, the studied urban form layers (streets, plots, and buildings) generated by the same software and then were arranged according to the historical evolution of the HHC. In the last step all the digitized urban form layers were examined.

3.2.1. Examined Areas. There is a clear distinction between the challenges of studying large urban forms of metropolitans and those associated with the more detailed scale of historic development in size and character. Because the HHC has changed over time, the size of the examined areas has included the area inside the walled city and also involved a 400-meter boundary that offsets outwardly from the city walls.

3.3. Data Analysis
The processes of analysis and measurement of the study maps were conducted in the following two steps: representation and definition.

3.3.1. Representation. In this step, the streets, plots, and building forms were based on redrawing the examined areas including all relevant physical and spatial properties and what they were associated with. Streets were represented based on drawing the boundaries of urban blocks. The plots were determined by the detailed boundaries found in the historic maps. Around 45 percent of the plots were checked during the site observations. The building forms were based on identifying the boundaries of physical structures stand inside the plots or at the street images, in particular, inside the limits of organic historic fabrics.

3.3.2. Definition. In this step, the analysis referred to the process of making the boundaries, and defining the patterns of streets, plots, and building forms representing different historical phases of the HHC. It was not very difficult when the definition of these patterns carried out at the scale of the whole city. Definitions were based on describing the physical qualities properties and spatial properties for each of the urban forms. Many of the identified patterns of HHC were found at the historic nuclei of the City of Baghdad, see [4, 6, 7].

4. Results (the Schematic Model)
The spatial schematic model is shown the component of the main physical and functional urban forms and how they distributed in the HHC, showed the arrangement of basic spatial patterns, as shown in Figure 6. The principal components are a fort with an organic zigzag street network, a scattered pattern of open public spaces, a compact built-up area, linear mixed residential-commercial uses, and peripheral military and manufacturing areas. This pattern has evolved in three main historic phases. The first showed the phase of formation, referred to the military purposes of establishing the old fort, and also was marked by the establishment of a combination of defensive details of the fort, citadel, the high walls, and the moat. The open urban spaces and enclosure adjoined the citadel have become the nucleus for urban settlement of residential compacted clusters over time. Then, the growth around the citadel had an organic pattern of compacted residential clusters, with a set of urban spaces and cul-de-sacs helped to connect and separate these clusters, including the mixed and commercial activities penetrating inside the residential areas. At the final phase, there were modern urban corridors connected the HHC at the periphery with the whole street network of the current city, which expanded outwardly from the city walls. In addition, a set of concrete building structures were added in arbitrary manner to the historic urban form. The last urban development was necessary to prepare good access points for facilitating the connectivity and accessibility among the whole city parts. HHC existing plan has shown a mixture of semi-rings axes from the citadel where the oldest part is located.
5. Guidelines for Architecture and Urban Heritage

As part of this current research study of targeting one of the most important recent nominated heritage sites, reported in the last list of UNESCO. Hopefully, the effort of this paper will contribute in shaping or guiding the process of issuing guidelines on the architectural and urban heritage protection under the power of national heritage of Ministry of Culture and Ministry of Planning. The guidelines here have included the protection of structures, or parts of remaining structures, and the preservation of the character of architectural conservation areas and urban forms. A detailed urban design and planning actions should be taken in the next periods due to protecting the remaining heritage of the HHC, similar concepts and practices can be found in [7, 15]. Some of these actions can be conducted with regard to:

1) Encouraging the planning authority of particular specifications that will be required a proper development in accordance with good conservation practices for the site.
2) Rehabilitation and retention of the existing traditional urban fabric and surviving material should contribute to the character of the structure, function, and condition.
3) Suggesting activities for the renovated parts should be assigned in relation to the sociocultural and historical values.
4) Converting urban spaces that primarily dedicated to accommodate particular needs into spaces that admit new cultural and traditional activities relevant to the present needs.
5) Processes of project management and site supervision should be conducted by specialized consultancy bodies in conservation, public or private based, during the progress of the required renewal and development phases.
6) Notifying relevant governmental structures (Municipality of Ramadi and Ministries of Tourism, Culture, and Planning) to assess the existing physical features that are divided into three groups:
   a) Architectural and urban features that are in need for conservation.
   b) Physical features and urban spaces that are in need for development or renovation.
   c) Physical and spatial structures that are due for re-built on the basis of conservation traits and local regulations.

6. Conclusion

This study yielded a sketch model which was based on describing the origin and development of the urban form of the HHC. Each citadel, nevertheless, had unique architecture and urban features related to the conditions and trends of its evolution. The patterns found in HHC were spreading in radial-
concentric order, westward for the former and eastward for the latter, from their cores on socio-commercial waterfronts. The core contained a citadel that was a concentric for ruling and military purposes, a surrounding commercial bazaars and alleys, and an adjacent organic style of compacted residential clusters (including an organic zigzag street network with a set of cul-de-sacs. The traditional Arab-Islamic residential clusters penetrated gradually at different periods of times, often during fragile socio-political times, at the expenses of cultural, commercial, and institutional activities. However, during Colonial and Iraqi periods, the compacted residential clusters were shaped on the basis of Western-style used a modern rectangular pattern of plots. These clusters were formed at the periphery and the city fringes and including a relatively linear style shopping district, distributed alongside of modern streets. Separating these two residential clusters was a spatial structure including organic and modern streets, cul-de-sacs, and urban public spaces. An industrial area, as small shops and workshops, in the traditional residential clusters was shaped in a scattered pattern, while in the modern area industrial activities formed at the periphery in a linear manner. The natural confines, Euphrates River, of surrounded the site of HHC caused spatial sectoral growth towards south and southwest. The residential clusters occupied the middle area enclosed by the fort walls or formerly by the urban spaces reclaimed lands located nearby the middle area. The densely traditional cluster with mixed commercial and residential land uses was located adjacent to the southern citadel edges, in which a strip pattern of modern housing clusters was shaped. In sum, it is apparent how the morphology of the HHC was modelled by different types of rule. Further investigations should include other Iraqi fortified cities to evaluate the derived schematic model.

7. limitations

The analysis has only relied on examining the case of HHC. The schematic model thus, needs to be extended with in further comparisons and case studies in order to increase results generalization and representativeness. Urban topics such as environment and syntactic properties of spaces have not taken into the account in this study. Hence, these issues and topics can impact the results.

8. References

[1] Hit 1980 The New Encyclopedia Britannica. V. Chicago: Encyclopedia Britannica, Inc. p.66
[2] Al-Ani R S 2002 The Continuity and Change in Morphological Structure of Cities: Comparative Analytical Study for Old and New Anna City Center of Urban and Regional Planning for Graduate Studies, University of Baghdad
[3] Salih S H 2016 Heritage Areas in The Urban Renewal Policies Center of Urban and Regional Planning for Graduate Studies University of Baghdad.
[4] Alobaydi D and Rashid M 2015 Evolving syntactic structures of Baghdad: Introducing ‘transect’ as a way to study morphological evolution In Proceedings of the Tenth International Space Syntax Symposium, London: University College London, UK (pp. 40-1)
[5] Rashid M and Alobaydi D 2015 Territory, politics of power, and physical spatial networks: The case of Baghdad, Iraq Habitat International, 50, 180-194
[6] Alobaydi D and Rashid M 2017 A Study of the Morphological Evolution of the Urban Cores of Baghdad in the 19th and 20th Century In Proceedings of the Eleventh International Space Syntax Symposium at Instituto Superior Técnico, University of Lisbon, Portugal, pp. 38-1
[7] Alobaydi D M 2017 A Study of the Urban Morphological Processes of Baghdad: Implications and Guidelines for Urban Design and Planning in Middle Eastern Cities PhD diss., University of Kansas, USA
[8] Kosambi M and John E B 1988 Three colonial port cities in India Geographical Review 32-47
[9] Sabr C 2016 Urban Form and Regulations: A Morphological Analysis of Erbil City PhD diss., University of Sheffield, UK
[10] Al-Jameel A H, Al-Yaqoobi D T and Sulaiman W A 2015 Spatial configuration of Erbil Citadel In Proceedings of the Tenth International Space Syntax Symposium, London: University College London, UK

[11] Conzen, M R G 1960 Alnwick, Northumberland: a study in town-plan analysis Transactions and Papers (Institute of British Geographers) (27), iii-122

[12] Moudon V 1994 Getting to know the built landscape: typomorphology Type and the Ordering of Space

[13] Moudon A V 1977 Urban morphology as an emerging interdisciplinary field Urban morphology, 1(1), 3-10

[14] Alobaydi D, Bakarman A M and Obeidat B 2016 The impact of urban form configuration on the urban heat island: the case study of Baghdad, Iraq Procedia Engineering 145 (2016): 820-827

[15] Mezini L and Nepravishta F Heritage and renewal of the historical urban ensemble of Ulcinj castle

9. Acknowledgements

Authors express gratitude to the Municipality of Ramadi and the libraries of Department of Architecture Engineering and the Center of Urban and Regional Planning for Post-graduate Students at the University of Baghdad (CURP-UB) for providing maps and data.