

# Form & Structure of urban Housing in Duhok City

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## ABSTRACT

This Research is an attempt to describe the existing urban form and structure of the residential area in Duhok city as an example for other cities in Iraqi Kurdistan Region. The research will study and analyze the spatial characteristic and typologies of urban housing and the transformation of its form and structure. The aim of the research is to identify the main urban form elements and livability of city neighborhoods to provide guidelines related to the future housing development. To achieve research objectives the research used "Qualitative" Methods to study and analyze the urban patterns of Duhoks neighborhoods, identify their typologies, layouts and design concepts. The Residential area in the city will be studied and analyzed by assessing settlements that represent the different residential typologies in Duhok City based on the rate and date of the development. On the other hand, the analysis of the urban patterns: the alignment and types of housing building, streets and open spaces, provide overlooking in the very detailed physical pattern of urban housing on higher scale. The main means for collecting the Data are: Observing and reviewing the maps, plans and documents from local government institutions. The results of the research identify challenges and opportunities facing future neighborhood development and provide guidelines for improving the efficiency of housing environment in the city.

KEYWORDS: Urban Form, Urban Housing, Residential Typology, Neighborhood, Qualitative Research.

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## 1. INTRODUCTION

Housing involves much more than just houses. As human basic need Housing should include all the services and facilities necessary for domestic life and good access to the wider community life. Successful housing must be integrated with its essential infrastructure and in cities this relationship forms a clear pattern (Towers, Graham 2005). The city of Duhok as an example of other cities in Iraqi Kurdistan Region has experienced a rapid urban growth development in the last decades due to political and economical situation in the region. This urban growth is accompanied by a rapid increase in the residential area. The housing area in Duhok city covers almost 60% of the city build up area (City center Master Plan report 2014). It defines herewith the city physical urban form and character. The main objective of this research is to identify the main elements of urban housing in Duhok, investigate the main patterns

and trends of housing development. The research proposes that there is a need to identify the housing characteristics and typologies to adopt sustainable and integrated urban design and development to achieve a livable community environment.

## 2. The concept of urban Housing

A large or a small city can only be recognized as a large or a small number of urban quarters (Krier, 1984). According to (Towers, Graham 2005) is it essential for a city to be structured to include urban components of quarter, neighborhood or local community. Clarence Perry 1929 described the neighborhood as a basic unit of city planning that should cover both dwellings and their environment including all public facilities and conditions required by the family for its comfort. The main components of the neighborhood according to Perry 1939 include at least dwelling units and elementary school, retail stores and public recreation facilities within reasonable or walk distance and with some sense of physical cohesion. The neighborhood is a self-contained community, at least for local services. It is served by public transport, has a mix of land uses, together with a mix of housing types and tenure (Moughtin, Clif 2005). The new trend in housing development is to increase density and quality of the housing environment. High-density residential areas are more economic to service; they have a lower impact on the

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environment; and they provide a wide choice of facilities within easy reach. Above all they make transport systems of high energy efficiency possible (Towers, Graham 2005).

### 3. Residential urban form and Structure

The urban form consists of number of physical elements which interact to formulate the city form. Dempsey N. (2010) defines five elements of physical and nonphysical features that make up the urban form of the city, which are size, shape, scale, density, land uses, building types, urban block layout and distribution of green space. Residential urban form is the spatial relationships between housing units and their services and activities. Residential structure results from the way designers compose the buildings and urban spaces to create urban form in different patterns and relationships. Streets and squares are types of urban form resulting from how individual housing buildings are brought together in the design, public, semi public, semi private and private urban spaces can be identified in the residential area (Biddulph 2007). A well-designed neighborhood is that give the area its own physical identity to make it a place with its own character, distinct from that of other places. Lynch (1981) suggests three factors of density, access system, and composition as the indicators of the external texture of a settlement, by which we may examine the performance of a settlement.

### 4. Factor affecting residential urban form and structure

The spatial organization of urban housing in terms of structure and forms is rapidly being influenced through land use planning and urban design creating various structure layout and forms of urban patterns. The main design elements of the residential area are the pattern of street, land subdivision, building layout and planed open space. The residential area is distinguished depending on well designed street, plot size, streets width, greenery and mass relation between buildings. The block size which represents a group of houses and the relations between blocks are equally important for distinguished residential design. The block design concerns orientation, grouping and building type (single or multifamily houses). The pattern of open spaces can influence the value of the residential community (Spreiregen P. D. 1965).

The hierarchical system of street in the neighborhood is needed to define the mode of movement. The built environment must accommodate the modes of transport that residents will use to get around. These include walking, cycling, using public transport and driving (Biddulph, M 2007). Generally, we can classify streets types in residential area as: arterial streets or highways: collector street which feed the highways, minor streets which feed the collectors and local road or alley (Spreiregen P. D. 1965).

### 5. Research objectives

The main aim of this research is to identify the urban form elements and livability of city neighborhoods to provide guidelines related to the future housing development. The research objectives are:

- Identifying,, classify and analyzing the types of urban housing, its pattern and the trend of housing development in Duhok City

- Determining the main planning and design concepts of the current housing structure in Duhok

- Providing basic recommendations and guidelines for future housing development.

### 6. Methodology

Based on the concept of urban form that refers to the physical components, which consist of streets pattern, building and open space the research used qualitative research methodology to study and analyze the urban patterns of Duhoks housing area, identify their typologies, layouts and design concepts. To examine the physical attributes of the residential areas including the structure and organization system of housing blocks settlements from different quarters of the city to represent the different residential typologies in Duhok City (traditional, formal planned and informal settlements) were selected. The criteria used to distinguish between key urban forms and structures include the following: density of development, the pattern including size and arrangement of housing blocks, the Land use and the movement path characteristics. The main means for collecting the Data are: Observing and reviewing the maps, plans and documents from local government institutions. Data Collection of some physical factors such as: components of neighborhood, density of development, movement access and land use, were collected by field work with the provision of land use map, photos, and field notes. Other physical aspects such as neighborhood services, housing layout and organization were surveyed by field observation.

### 7. Historical Housing development in the study area

Duhok City, the capital of Duhok Governorate, one of the three main cities in Iraqi Kurdistan, expanded enormously in the last 35 years. The political and economical situation in the region led to rapid urban growth of the city. In general the city expansion has proceeded largely in an east-west direction because of its topography. The historic settlement of an approximately 2 x 2 km compact centre evolved into a settlement strip of approximately 15 x 3 km with approx. 280,000-300,000 of official population (City Center Master Plan Report 2014). The greatest developments took place between 1973 and 1984 as well as between 1986, 1994 and in particular after 2006. In 2006 Duhok city expanded significantly because that period was characterized by significant economic growth and also was characterized by security compared with other Iraqi cities, which led the people to migrate from central and southern Iraqi cities to Duhok city (Abdullsamad, 2011). The urban growth of Duhok is accompanied by a rapid increase in the residential area that represents the main physical urban component of the city structure covering about 60% of the city built up area. The special socio economical factors led to the formation of informal settlements in the suburbs of the city. Informal settlements in City of Duhok refer to illegal or semi-legal urbanization which occupy 5 % of the total area of City (Mohammed, 2011). In general the city residential area consists of the old city center, the northern Duhok, southern Duhok, eastern and western neighborhoods. The age of the development of these neighborhoods decreased as we move from the historic city

center neighborhoods towards the suburban area. The population density in Dohuk ranges from less than 50 to more than 250 inhabitants per hectare and differs in the various residential areas. The highest density, with more than 250 inhabitants per hectare, can be found in the southern parts that have been developed in 1984. The

northern parts of the city and the center of Dohuk also have a comparatively high density of between 200 and 250 inhabitants per hectare. The younger neighborhoods, developed in the 1990s, show lower densities (Fig.1) (Municipality of Duhok 2014).

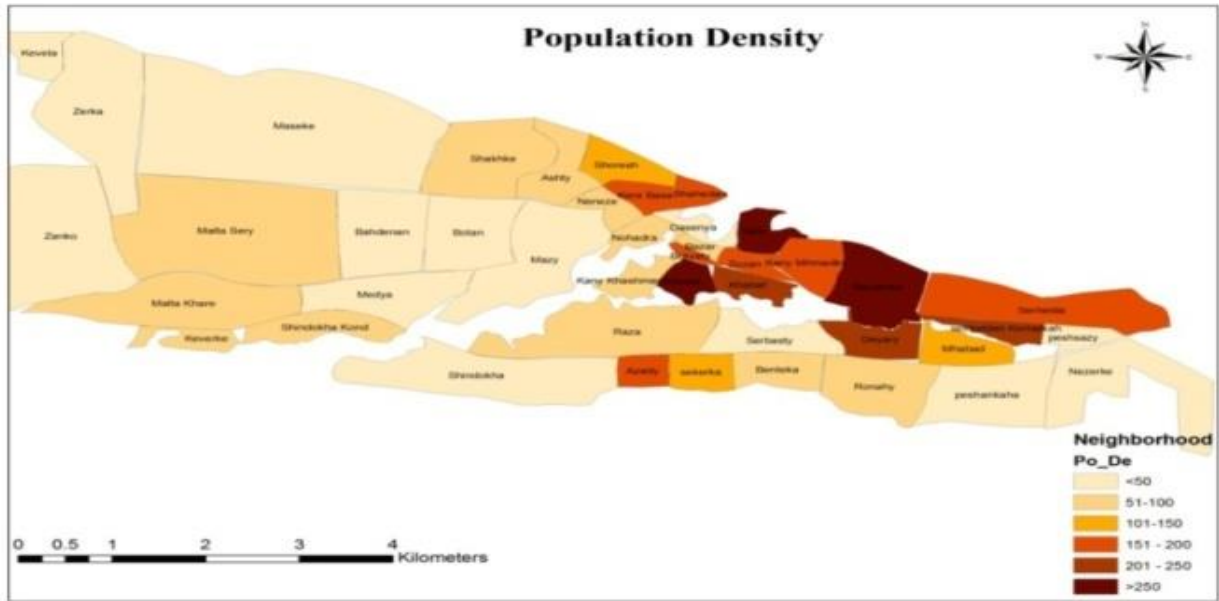


Fig 1: Residential Development and population Density in Duhok City, source: Municipality of Duhok 2014

**8. Results Analysis**

**8.1 Housing Typology**

Duhok includes four main Housing types:

- 1.The Traditional inner city neighborhoods including the old city center and the surrounding neighborhood with their main commercial streets and compact housing and street grids.
- 2.The formal planned residential housing area in the eastern and western part of the city. The formal expansion of the city master plan in 1980s, 1990s 2000s led the municipality to develop plans for the new residential area including the suburban area. These Housing areas consist of more regular plots size and large streets width. There are significant numbers of vacant or undeveloped plots of the public and social facilities in the new developed area.
- 3.The Informal settlements consist of legalized and illegal housing, which suffer from many problems such as lack of

facilities and services, improper land use, shortage of open and public spaces.

4.New developed residential area by investors consists of the multifamily housing which area developed after 2006 due to the city socio economic development according to new housing policy of the Government to encourage private housing industry.

The research will focus on the above three first types, which represent the fundamental residential types of the city. Four settlements were selected including the traditional inner city settlement (Shele) developed in the 1970s, the formal planned (Grebase) developed in the 1980s, and the legalized informal settlement (Baroshke) developed in the 1990s and the formal new developed one during the 2000s (Masike). Fig (2) shows the different housing typology in the city.

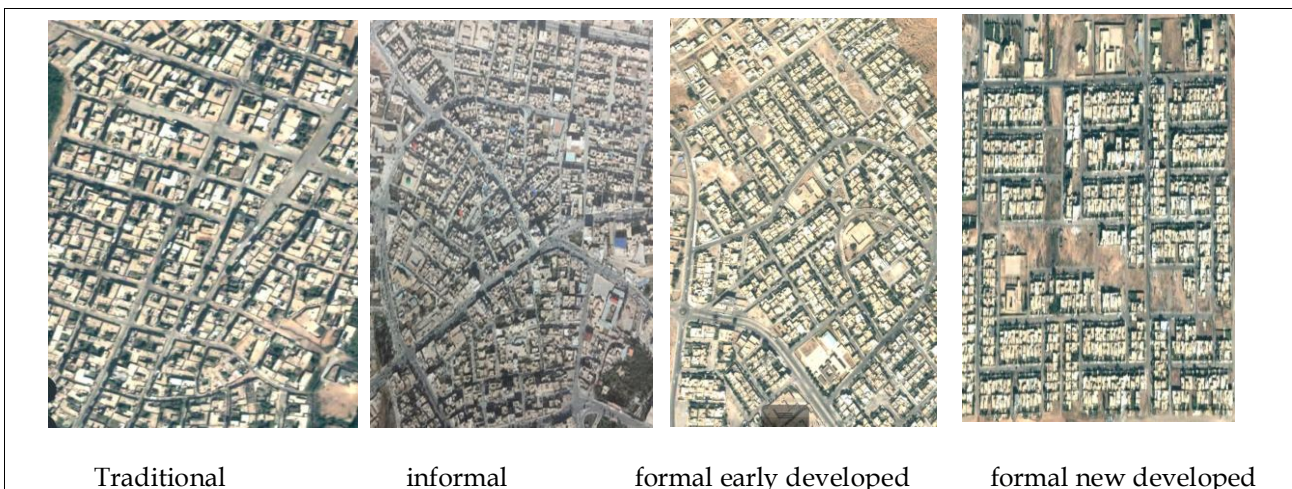


Fig 2: Various Residential Typologies in Duhok. Source: Google Earth

**8.2 Results of selected Case Studies**

**8.2.1 Residential Urban Form and structures in Duhok**

The important elements that define the physical form of any residential area are the dimension of its streets, housing blocks and, its plots as well as the various land uses. The main characteristics of the different residential types are:

- The historic and traditional urban fabric seems to have developed from lack of planning, mostly developed from individuals according to the cultural and environmental needs. They are characterized by a pattern of narrow streets, forming street blocks of irregular shape and of small size plots and buildings. The housing blocks on the main commercial street are transformed to commercial activities such as shops, restaurants etc. (Fig 3).
- The formal planned urban form was established with regular grid patterns, building regulations and zoning outlined compulsory setbacks and site-coverage limits with a hierarchy of streets, rectangular blocks. The neighborhoods are surrounded by a main street mostly 20-30 m width, collector street 20 m width and minor or access street of 10 m width. The street ends with nodes as neighborhood facilities. The implementation of these

facilities depends on the available finance sources and the rate of the development. Housing patterns are mainly influenced by economic considerations and formal planning and urban design legislations. The early developed area are more compact with mix land use and available neighborhood facilities such as shops, services, offices, leisure, health and education facilities and culture. The new developed area (Fig 4).

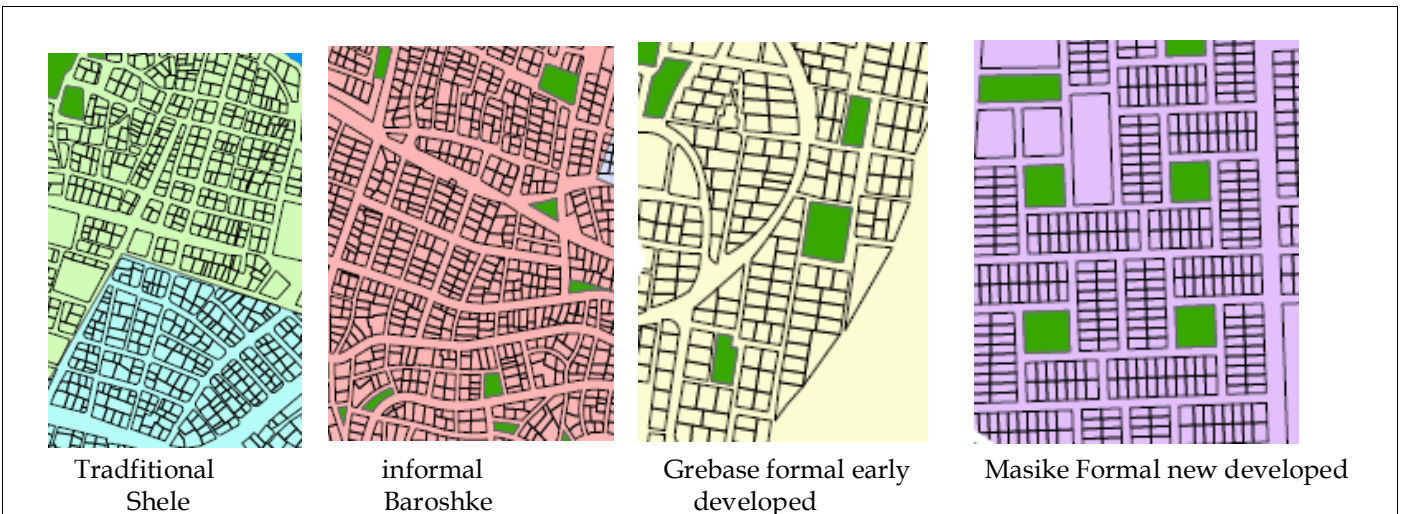
- The streets in the new formal planned housing are wide to provide fast connectivity among different sectors of the city through the cars instead of walking. The Building Types are single family housing units with linier Blocks. The Building style depends on the socio economic situation.
- The legalized informal housing suffers from narrow streets, lack of accessibility and greenery. The Housing blocks sizes are smaller than these in the formal planned area.

The historic and informal neighborhoods are mostly occupied by low income families. The sidewalks in all types are not well designed and uncomfortable for walking. (Fig 5).



Traditional Shele                      Informal Baroshke                      Grebase formal early developed                      Masike Formal new developed

Fig 3: Street Patterns and Land use of the various Housing Types. Based on Maps from the Municipality of Duhok



Traditional Shele                      Informal Baroshke                      Grebase formal early developed                      Masike Formal new developed

Fig 4: Block arrangement and plot division of different Housing typologies in Duhok based on Maps from the Municipality of Duhok



Fig 5: The side walk and Building system in various Housing Typologies

## 9. Conclusion

The research concludes that the residential areas in Duhok city vary in term of neighborhood components; Streets. Open space, Building, neighborhood services. The patterns are different with respect to following:

- **Street Design:**

- The dimension of street blocks and of plots increases as we move from the historical centre to the peripheral parts of the city. The traditional and informal quarters are irregular divided with lack of street hierarchy. The formal planned Housing are regular divided with a hierarchy of streets, rectangular blocks and plot subdivision. The development of the streets patterns is more compact in the early developed area. The legalized informal housing suffers from narrow streets, lack of accessibility. In general there is lack of safe pedestrian and greenery

- **Land use diversity:**

The existing mix land use activities depends on the range of development. More compact in the early developed area. There is Lack of services and green area in the early developed area and the informal settlements.

- **Block and Building Design**

The spatial geometry of the historic tradition is irregular, compact and mostly surrounded with commercial activities on the main streets. The planned urban forms are regular, grid housing patterns influenced by planning regulations. The housing pattern and building styles are mainly influenced by economic consideration and formal building regulation. The new planning and design style do not consider the social, cultural and environmental dimension of the tradition of court houses. Diverse block configurations, building types and architectural contribute to identify neighborhood which to distinguish the character of them. The informal housing are developed as result of housing need with small plot and size.

## 10. Recommendations

Due to research finding following recommendations and guidance for policy makers and governmental institution are identified:

- Create policies and implementation tools that defined the neighborhood characteristic and urban forms.
- Delivering sustainable housing in term of integrating of school, community centers transports and amenities

- Enhance the livability of the neighborhood (by upgrading the quality of development and improving the quality of public realm.

- Establishing street hierarchy and improving the sidewalks

- Formulating building and design standards to raise the quality of design

- Determine appropriate urban design elements at the neighborhood level such as sidewalk width and material, street lights and trees and attractive landscape architecture.

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