

# Urban morphology, a necessary knowledge to survey the city (the case study: Qazvin city in Iran)

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## Abstract

*Urban morphology is a knowledge which its importance of it has been neglected a lot. The usages of this knowledge in urban planning are numerous, for example in energy, justice, general health and heritage. This paper will emphasize on the usage of urban morphology on heritage and tourism. Actually, by surveying the four elements of urban form (Natural context, streets system, plots system, buildings system) we can study the morphology of the historic city in the best way. It should be said that streets system, plots system, buildings system obeyed from the natural context and its features. Natural context consists of many elements such as topography, climate and water and so on which each city has its own features. All of these natural features effect on the other three elements of urban form that in surveying the case study it will be described. The case study of this paper is Qazvin city in Iran. This historical city has been located nearly in north of Iran and is a dry city with mild weather. This city has some individual features which by surveying them we can find some principles about traditional urban planning of cities of Iran. In this study I will show that by surveying the four elements of the historic area of this city we can survey it more comprehensively and completely.*

## Keywords

*Urban morphology knowledge, British school, the elements of urban form, historical Qazvin city*

## 1. The usage of the knowledge of urban morphology

The knowledge of morphology has not its appropriate place in urban planning. This knowledge has some usages in some fields such as health, social justice, tourism and heritage, climatic change and energy. In brief, in health field it refers to improving physical activity and walkability and the effect of different elements of city on this.

In the field of social justice there is an important relationship between the form of city and social justice which needs more research. There is also a strong relation between climate change and consuming energy and form of city. There is an important effect in organization of the elements of city in creating resilience cities. There are also some models to measure the consuming energy, lighting, transportation in relation with the form of city.

There is a discussion about the relation of economy and form of city as well. In this case the relation of the density of city with the cost of transportation and greenhouse gases emission are studied. Also, there is a great emphasize on the tourism and heritage issues. This paper will emphasize on the last usage of the knowledge of the urban morphology which is tourism and heritage.

It has been proved that tourism is one of the strongest economy in the world.

One the biggest challenges in this case is reserving this heritage during the evolution of cities. Creating suitable and effective approaches in reserving urban heritage is so important and knowledge of urban morphology has a great usage in this case. (Oliveira, 2016, p181).

### 1.1. British school

M. R . J Conzen was a German geographer who migrated to England before world war and teach geography. Conzen was famous because of his detailed study in Alnwick city (1960). Conzinian school has been known as “Birmengam school” as well (Modoun , 1997 , p1). Conzen knew the city as a prescription of society and culture. Conzen identified three elements in city: streets, plots and buildings. These elements compose with each other like a puzzle. A unit plan can be seen as a part of urban fabric.

Unit plans have special feature which include street pattern, buildings and plots. Unit plans reflect economic – social context of the periods that they have been formed ( whitehand, 2007 , p3).

### 1.2. Italian school

Muratori is the first researcher and analyser of urban form. He was called as a spiritual father of morphological approach in architecture and urban designing.

Italian school has been known as typology – morphology approach, because type has the main role in this approach.

Muratori was known due to the study on the history of Venice in 1959. According to Muratori , the structure of city can only be realized by studying the historical evolution and it is based on the typology of buildings to analyze the city.

### 1.3. French school

French school was established at the end of 1960s in France. Philippe Panerai and Jean castex are the founders of this school. French school was created in continuation of Italian school of thought studies with association of Lefebvre and Boudon’s ideas essence. Among them, Rossi and Aymonino had more influence on French school than other scholars of Italian school of thought such as Caniggia. French school believed that the accumulations of different fields were effected on urban morphology. In fact the goal of morphological studies in France is measuring the amount of reality in different theories, which is based on the evaluation of their impacts on urban forms and patterns and also definition of significant components that are needed to redefining the developments of new terms in urban planning. In French school sociologist, historian, geographers, and urban planners all cooperate with architects to understand the cities much better(Pourmohamadi , p9).

### 1.4 ISUF school , a composed school

In 1980s and 1990s three schools (British, French, Italian) were integrated to make a united sciety which was called ISUF (international seminar on urban form). This society tries to develop and conduct international urban morphology and urban typology thought (Oliviera, 2016, p7).

In fact the aim of this society is helping schorals and expert to use relevant approach for each case study.

So, this society were established to gather scholars for a common issue.

It is believed that the city can be “read” and its form be analyzed by its elements.

This analyze is based on three principles:

- 1- Form of city which is defined by three physical elements: buildings, plots, streets

- 2- Urban form can be perceived in different levels and generally is divided to four levels which are building / plot, street / block, city and region
- 3- Form of city can be realized just in historical evolution as the city has some elements which continuously is changing and replacing

So, form, clarity and time are three fundamental elements in urban morphological research and these elements always exists in any urban morphological studies.

## 2. The elements of city

Generally, most of cities and its fabric have been included by urban elements: streets, plots, buildings. However, in each city the combination of this elements is different and create different fabrics. This causes that each city takes its special feature in its fabric. Time is the most effective factor in forming the city during the time.

The urban elements and their relation can be surveyed in different scales from large scale to small scale. More detailed view more detailed components. In the other word the scale of surveying can be in large level streets and lanes or in small scale like buildings or even materials (Oliviera , 2016 , p 10).

In this case we can mention the main elements of form of city which are natural context, streets system, plots system and buildings system. These elements are according to Cozenian approach which nearly most of other urban schools and approaches are agreed with it.

### 2.1 Natural context

The first effective factor in form of city in natural context. Natural context includes different factors which effect on form of city such as topography, direction of wind, sunshine and climate, view, soil, water and many other factors (Oliviera, 2016, p 13).

Actually, the other elements of city are depended on some variables which are affected from these natural factors, like streets and lanes, form of plots and type of buildings. This causes different fabrics form in each city.

Maybe the first settlements or cities were obeyed from the feature of natural context much more than contemporary cities. However, how much human beings tries to omit the effect of natural context during the development of the contemporary cities, the effect of natural context can't be ignored in forming the city.

### 2.2 Streets system

Streets are the most durable elements of form of city. During the time in spite of large transformation in cities, streets have more durability than other elements of city.

Totally plots system has less durability than streets system and buildings system has much less durability than the other urban form elements (Oliveira, 2016 , p17).

### 2.3 Plots system

Plots system includes buildings and its open spaces (Pour Mohammadi, 2011, p4).

Plots system separate different public and private territories. Plots systems usually doesn't be considered in city scape and in the evolution of forming the city. This was because of low visibility of plots.

These questions are presented about the features of plots: 1) how does each plot relate with street? (What is the size of plot? What is the orientation of plot toward the street?) 2) what is the situation of

each plot in plots system? (Is it located in the middle or the edge of block?) 3) what is the form and its dimension and proportion? (Oliveira, 2016, p18).

## 2.4 Buildings system

Buildings has the least durability in comparison with two other systems. It is the most important urban elements and the most visible one. There are two types of buildings, general buildings and special buildings. General buildings are the majority of city; similarity between this kind of buildings are more than their differences. Most of general buildings are residential.

## 2.5 Conceptual model of the relation between the elements of urban morphology

The relation between the elements of the form of city has been presented in Figure 1 as a conceptual model. Natural context was an independent factor and effective on the other three elements which are streets system, plot system and buildings.

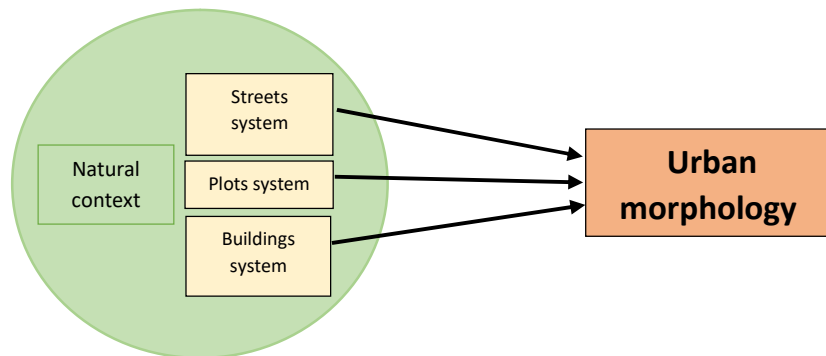


Figure 1. conceptual model of relation between elements of the form of city

## 3. The case study, Qazvin city

Qazvin city has been selected as the case study of this research. It should be said that the period of this research is in the dynasty of Qajar period (1796 - 1925 ). Therefore the factor of time that is one of the main factors in urban morphology in British school has been omitted and the term is investigated only in Qajar period.

### 3.1. Natural context

The city of Qazvin has semi dry climate. General slope of Qazvin is from north to south.

Qazvin has traditional gardens that has surrounded around the city. These gardens has more than one thousand years old.



Figure 2. Historical area of Qazvin and traditional garden around it.

Qazvin is always a city with limited sources of water but due to its seasonal rivers (Dizaj river & Aranzak river) and some Qanats, this city is always describing as a flourished city with green gardens.

Qanats of Qazvin has a long history (from 13th century) in figure 3 this Qanats and their mouth can be noticed. These Qanats supplied the water of city and formed water infrastructure of city. They irrigated hydraulic structures, houses and other parts of Qazvin city.

The figure 3 shows that most of Qanats was appeared in city and water flowed on the ground.

It can be said that the water of Qanats (when it was appeared on the ground) made a part of city scape.

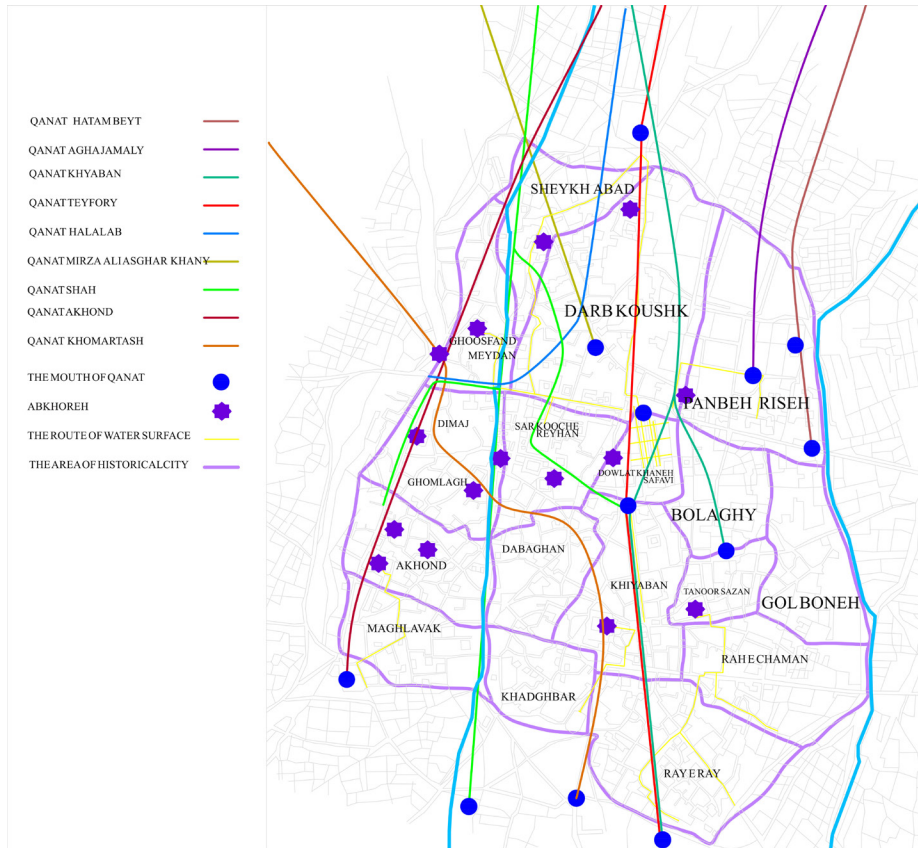


Figure 3. The path of historical qanats of Qazvin and two rivers (Dizaj & Aranzak)

### 3.2. streets system of historical city of Qazvin

Streets system of each district followed from the form of district. The general rule that has been respected in most of districts is respecting special hierarchy. First it entered to a dead-end street, then reached to a secondary street then jointed to the main lanes, it finally reached to the main structure of city which is bazar. The total shape was in a cluster form and these clusters created the whole of city (Mojabi ,2009, p123).

In the figure 4 some important lanes in historic area of Qazvin have been mentioned.

In the table 1 the names of features of some streets of historic area of Qazvin have been noted.

**Table 1 – description of some of the streets of historic area of Qazvin**

Streets system	Name of lane	Direction of lane
Main lanes	Sepah street	North – south street
	Peyghanbari street	North – south street
	Naderi street	North – south street
	Pahlavi street (Imam Khomani)	East – west street
	Saydee street (Molavi)	North – south street
	Tehran – Montazeri street	East – west street
	Bolaghi street	North – south street
Secondary lanes	Dabir street	North – south street
	Tabriz street	North – south street
	Gilani street	North – south street
	Mohamadiye street	East – west street
	Homd olah Mostofi street	East- west street
	Obeyd Zakani	North – south street
	Lane of Rah eh Ray	North west – South east street
	The lane of Shrine of Esmail	North – south street
	Saghafi street	East – west street
	Lane of Zaegar	North – south street
	Lane of Malek Abad	North – south street

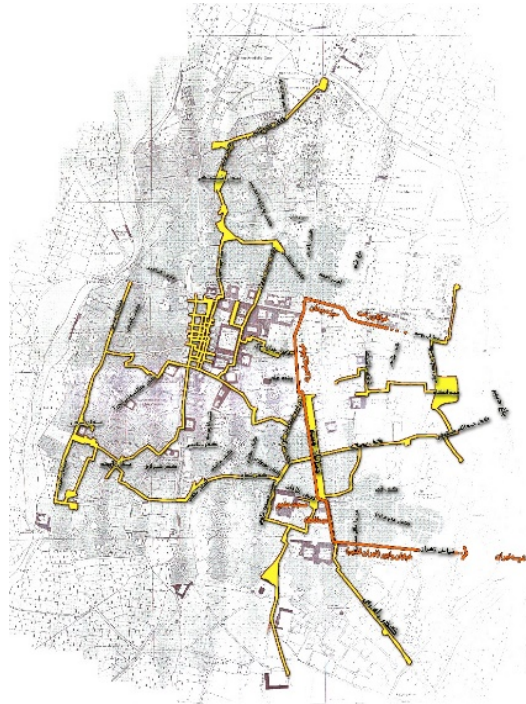


Figure 4 . Important historical streets of Qazvin

One the most important streets of Qazvin is Sepah street (figure 5). This street was built in 15<sup>th</sup> century during Safavian dynasty. Qazvin was the capital of this dynasty in the beginning of this capital then it was used for military and governmental activities. The importance of Sepah street was mitigated after moving the capital from Qazvin to Isfahan city. In Qajar period safety and commercial activities were increased in Qazvin city and Sepah street was noticed again as a place for governmental ceremonies . In this time two matters were happened in this street, the first one was building a guest house at the end of street and the second was creating a commercial façade in two sides of the street (Parsi, 2011, p216).



Figure 5. Sepah street in Qajar dynasty

### 3.3 Plots system

Qazvin city in Qajar dynasty had 16 districts. The figure 6 shows Dabaghan district one of the districts of the south of historic area of Qazvin and its plots system. The shape of districts of residential districts were organic and non-geometric and districts in different cities were individual and rarely were similar with each other (mojabi, 2009, p123).

The reason of irregular form of most of plots in cities of Iran was the infraction during the building of structure. It means that the owners of plots infringed from the order of plot and made their buildings in a non-geometrical shape. While in farms and gardens were formed more ordered and regular because it was required to measure the water which is needed for irrigating (English , 1988, p7).



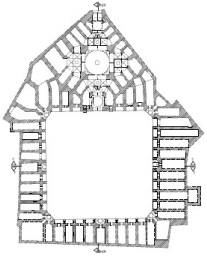
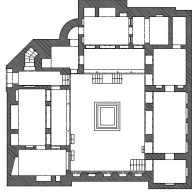
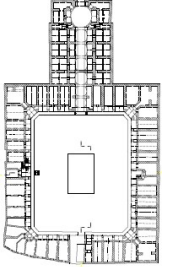
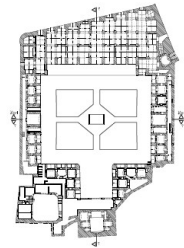
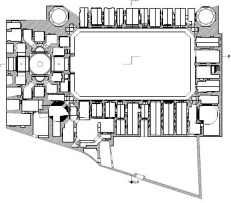
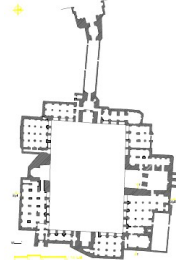
Figure 6 - Dabaghan district

### 3.4 Buildings system

Buildings system includes some features such as form of building, height of buildings from the floor and landuse of buildings and even materials. Totally two types of buildings can be divided: special buildings and ordinary buildings (Oliveira, 2016, p 28). The buildings of historical area in Qajar dynasty can be divided to some types such as residential, religious, caravansaries, hydraulic structures such as bath, traditional ice house, water reservoir. Distribution and of these two kinds of buildings had an important role in buildings system; cityscape was formed by distribution of these three types. Table 3 is presenting some plans from Qazvin in Qajar dynasty.



Table 2. some examples of different historical plans with different functions

	Haj Reza caravansary		Plan of a traditional house
	Razavi Caravansary		Plan of Salehiye Mosque
	Golshan caravansary		Plan of the Great mosque of Qazvin

#### 4. Discussion

With reviewing the elements of forming the historic area of Qazvin city it can be said that this city because of locating in traditional gardens and placing between two seasonal rivers (Dizaj & Aranzak rivers) has a special and distinct natural context. Some streets of this city (in streets system) were important which Sepah street is one of them. In this wide street the streams which came from Qanat Teyfory flowed in it from north to south. These streams made a part of the street scape. In buildings system distribution of different types of buildings such as residential, religious and hydraulic structures obeyed from the water system of city which were the paths of Qanats. In west part of city water of Qanat flowed in underground and in central and east parts Qanats were appeared on the ground and streams made a part of cityscape (figure 3).

Buildings system was consisted from two kinds of buildings: special and ordinary. Ordinary buildings generally consist of residential buildings and special buildings. Special buildings consist of religious buildings, governmental and commercial such as Bazar and hydraulic structures such as water mill, water reservoir, bath, wash house, Akhore (Payab) and so on. Distribution of these structure has been reflected in figure 8. The figure 8 shows the location of some of hydraulic structures which have been located in the path of Teyfory Qanat.

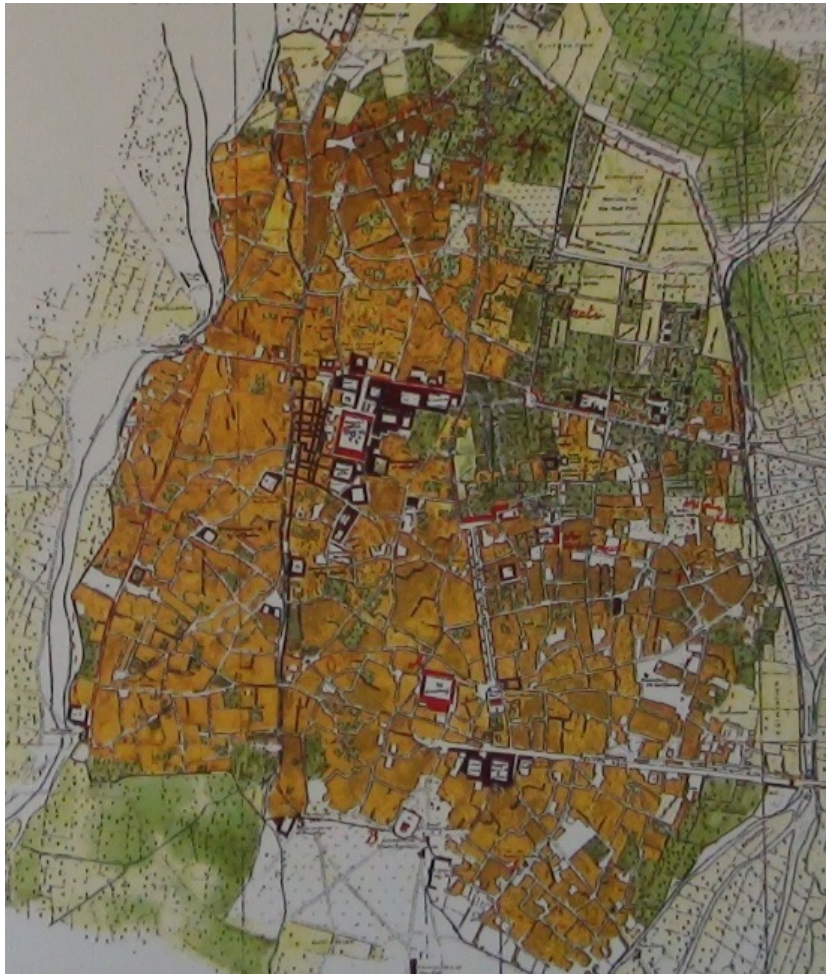


Figure 7. Map of Qazvin in Qajar period (19<sup>th</sup> century)

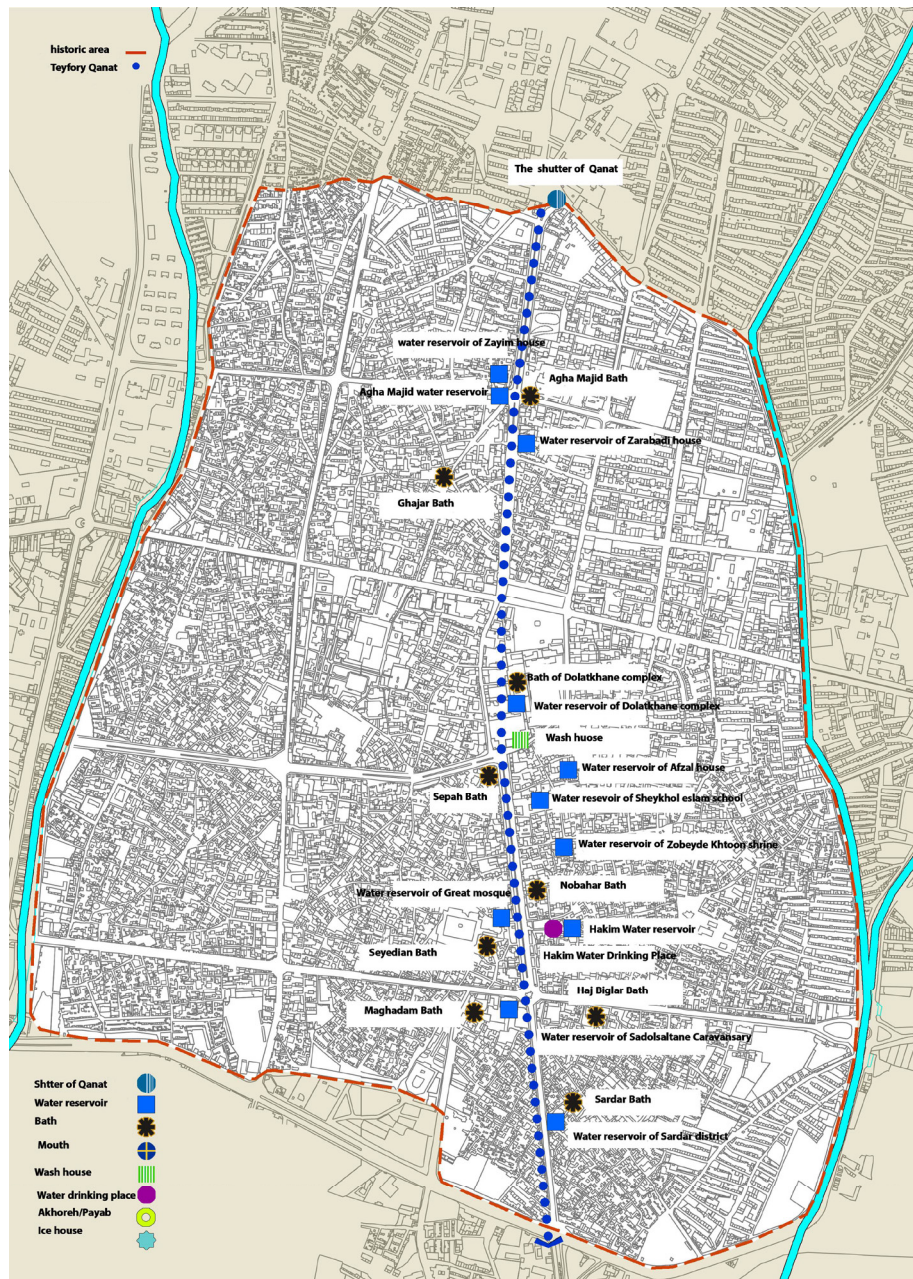


Figure 8. Path of Teyfory Qanat and districts of the historical city of Qazvin

## 5. conclusion

The knowledge of urban morphology has 100 years old but it doesn't be considered seriously till now.

Knowledge of urban morphology has very useful usages in different fields such as tourism and heritage and effective usage of this knowledge help to study the city better and more careful. It will lead to better decisions in rehabilitation of historic city.

By categorizing the elements of city to streets system, plots system, buildings system that all of them are formed in natural context we can analysis the features of urban fabric clearly.

**Table 3. shows the features of four elements of form of city (Qajar period):**

Natural context	Streets system	Plots system	Buildings system
<ul style="list-style-type: none"> <li>- Locating between two seasonal rivers (Dizaj &amp; Aranzak rivers)</li> <li>- mild slope from north to south</li> <li>- traditional gardens around the city</li> </ul>	<ul style="list-style-type: none"> <li>- dividing streets in two divisions main lanes and secondary lanes</li> <li>- Sepah street as a ceremonial and important street of city</li> <li>- flowing water (water of Qanat) in north-south lanes, like Sepah street</li> </ul>	<ul style="list-style-type: none"> <li>- there are 16 districts with organic urban fabric, their plots usually are irregular and mostly the buildings surrounded around the plot</li> <li>- in some cases, buildings were shaped like L or linear because of the small size of plot.</li> </ul>	<ul style="list-style-type: none"> <li>- division of buildings two types, special type and ordinary type (generally residential buildings)</li> <li>- following the location of hydraulic structures from the path of Qanat</li> <li>- using commonly from brick and adobe and orientations like tiles that formed the city scape</li> <li>- commonly the height of buildings has one or two floors except special buildings like mosques, mausoleums and water reservoirs</li> </ul>

Totally I tried to survey the historical area of Qazvin city with using Conzenian approach that is a common and agreeable approach for all urban morphological approaches. Historical city of Qazvin in Qajar era had a special natural context because of the traditional gardens and two seasonal rivers. In streets system of this city, we can divide the lanes to two types main lanes and secondary lanes. Sepah street was one of the most important main lanes of the city. The water of its streams was provided by Qanat. In the rest lanes water of Qanats was flowed in north – south direction after reaching to the ground and made a part of cityscape. The plots system of city hadn't geometrical shape and the mass of buildings usually were formed in four or three sides of plot. In some cases, the mass of building was formed in two sides of plot and rarely in one side of the plot. The buildings system of Qazvin city in Qajar era were consisted from two types, ordinary buildings and special buildings. The maximum height of ordinary buildings was two floors height. They were built by brick and decorated by glazed tile. These buildings made the city scape of Qazvin city. Special buildings like mosques with its distinct body and also some water reservoirs played as landmark in city.

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