

# Morphology of Yazd Urban Textures and Their Comparison

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## ABSTRACT

Geographical state of Yazd city and its importance has caused that different important highways pass through it and this has affected social and economic features of the city. Transformations in this city have been always accompanied by geographical development and increase in population size. It is obvious that the historical texture of the city has also been affected by these changes. Therefore, it is necessary to investigate this texture. In the first step, we analyze development processes of Yazd city as an important aspect and then city districts. Finally, we investigate morphology of historical textures, new textures and transitional textures (from historical to modern). A comparison of textures of different districts of Yazd city revealed that traditional architecture of these regions is completely consistent with sustainable architecture principles. Modern interventions like establishment of urban complex plans, passages widening projects and so on have had undesirable impacts both in buildings architecture level and in spatial structuring of arid cities.

**KEYWORDS:** Yazd City, morphology, historical district, modern districts, transitional districts (from historical to modern)

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## INTRODUCTION

Geographical state of Yazd city and its importance has caused that different important highways pass through it and this has affected social and economic features of the city. Yazd is one of the few historical cities in this region which has retained more or less its historical form. Therefore, it is necessary to investigate its texture. In order to explain the historical texture of this city, a comprehensive study is inevitable. In the first stage, we investigate development processes of the city. Then, city districts are analyzed and finally morphology of historical textures, modern textures and transitional textures are investigated. Today, Yazd city is composed of two smaller cities which have few common points. On one hand, we have a historical town with organic and balanced development. On the other hand, we have new developing region with modern standards and planning. The modern town does not follow the planning of the historical town. In spite of obvious social and cultural links, the physical form has not been successful and has experienced an imbalanced and spiritless development.

### Statement of problem

Yazd city was selected as the target of this study because it is one of the few historical cities which has retained its historical form. This study first aimed to prove that destruction of the importance and value of the historical texture of the city was not only the result of construction material erosion but it was resulted from a large number of cultural, economic, social and political factors. Possibly being historical is the most important aspect of Yazd City. Since the structural and cultural and social heritage have intertwined links, it is possible to learn from past. Thus, it seems important to investigate the history of the city and consider it as an important factor.

The historical part or the very old part of the city includes old and important parts of the city between 10<sup>th</sup> Farvardin Street and Martyr Rajayee Street in south, Dolat Abad Boulevard and Shahid Saeedi Boulevard in west, Basij and Fajr Decade Boulevards in the east and Fahadan and Besat 10-meter-wide and Seraj Streets in the north. These districts are regarded as the historical districts according to an agreement between City old section renovation office, ministry of housing and urban planning, organization of housing and urban planning in Yazd City and Organization of Cultural heritage and Tourism in Yazd City.

The historical part of Yazd has 7 main districts and 42 subsidiary districts. The old and historical districts have been changed a lot as a result of social and economic structural changes and population migration to the city. The system of social values in the historical texture has gradually faded away. Rich families and real owners of this district have left this texture and have submitted it to strangers. Therefore, the common relationships among neighbors and social discipline of the district have been disappeared. Furthermore, new streets have changed the old texture of the city and subsidiary regions remained from Reza Khan Period are prone to annihilation. At present, there are seven principle districts: Fahadan, Godal Mosalla, Shesh Badgir, Gazergah, Sheikh Dad, Dolat Abad and Gonbad-e-Sabz.

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Each district has its own cultural identity. The main linking element for these districts is bazar. Religious centers are the bases for this classification. Mosques, open spaces, water storages, public bathrooms and other urban elements can be found in each district.

Array of urban installations and constructions in the center of a district is one of the principles of urban planning in Safavian Dynasty in Iran who reigned in 15<sup>th</sup> and 16<sup>th</sup> centuries in Iran. urban design and planning changed and developed a lot in this stage. Isfahan is the masterpiece of this time period. District center hub was designed in the form of a square with special facilities and services. An open public space for conduction of religious ceremonies is the center of this square. Because of central situation of the religious open space, there is an appropriate access to linking network. Usually, each of these spaces has access to outside of the city and a direct path towards bazar.

Transitional regions of Yazd City include some historical parts of the city in which modern construction is emerging like Sheikhdad and Gonbad-e-Sabz regions.

**New Development of the city**

Balanced development of the city continued until early years of 20<sup>th</sup> century. In spite of the fact that city texture inside city range is not consistent with special feature of buildings, the city developed as expected. The first action to go to modern building started with development of new street (today regarded as central street of the city). This street passes through the southern part of this historical place and contains two blocks in the two main exits of the city. The traditional balanced development of the city weakened as new streets were developed. The old bazar lost its importance in the coming years as a result of development of new business activities.

Then, the two-dimensional development of the city started. The basic development started with construction of new streets and squares which does not involve any particular district system. Moreover, there are historical centers which should be linked to the main street. This uncommon combination in this part of the city had a special shape.

Emergence of new streets occurred mainly in 1956-1964 as a result of inappropriate planning. Consequently, new streets were planned and developed which passed through the historical districts in order to facilitate access. As a result, many historical monuments were destroyed. Many districts were destroyed and remainders of the old bazar were transferred to the new streets, small stores were evacuated in centers of districts and individuals were transferred to new districts from historical centers. New streets were bounded by buildings with heights greater than those of historical buildings. The structure of ring road determined the future development trend of the city. The structure of the new city is not consistent with the historical city. The new and modern planning is completely inconsistent with the rich local culture. Development of the new city is a combination of direct linear and radial growth and is by no way similar to the historical region. The new network does not support the historical district center hubs and there is no symmetry in array of streets. This new city is a city without identity and does not have any useful development plan and is a dependent city in terms of services, physical criteria, cultural features and economic features.

**Structure of Yazd city**

In order to study the structure and texture of the city in terms of open spaces, mass distribution, routs and streets, blocking, surface area statistics, direction, buildings edges, buildings directions, divided volumes, district, buildings distances, establishment, six districts were investigated. It should be mentioned that two of these six districts were historical districts (Fahadan and SheshBadgir districts), two were completely modern districts (Azadshahr and Safayeeh districts) and the other two districts were historical districts (Sheikhdad and Gonbad-e-Sabz districts) which were experiencing modern urban changes and in other words, these two districts were transitional districts.

New districts	Transitional districts	Historical districts
 <p data-bbox="267 1827 381 1843">AZADSHAHR ▲</p>	 <p data-bbox="651 1827 803 1843">GONBAD-E SABZ ▲</p>	 <p data-bbox="1034 1827 1128 1843">FAHADAN ▲</p>

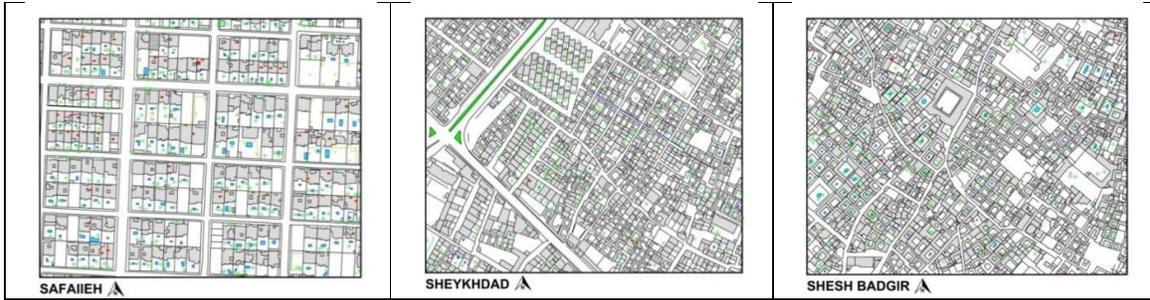
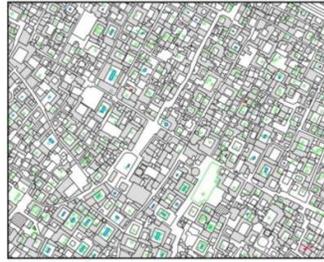


Figure 1. six regions studied in Yazd City, source author

Free spaces		
<p>AZADSHAHR</p>	<p>GONBAD-E SABZ</p>	<p>FAHADAN</p>
<p><b>New district-Azad-shahr</b></p> <ul style="list-style-type: none"> <li>- Row-like structure, free spaces surround volumes monotonously</li> <li>- Observation is possible only in one direction. Access for both rows</li> </ul>	<p><b>Gonbad-e-Sabz district</b></p> <ul style="list-style-type: none"> <li>- Free spaces contain volumes to some extent monotonously and irregularly</li> <li>- Access to new regions in both rows and in old regions in main and subsidiary alleys</li> </ul>	<p><b>Fahadan historical district</b></p> <ul style="list-style-type: none"> <li>- mass construction of yarded houses</li> <li>- free spaces are divided via thin and wide connecting paths</li> <li>- connecting routes are irregular</li> <li>- observation is impossible</li> <li>-access: principle and subsidiary alleys</li> </ul>
<p>SAFAIEH</p>	<p>SHEYKHDAD</p>	<p>SHESH BADGIR</p>
<p><b>New district-Safayeeh district</b></p> <ul style="list-style-type: none"> <li>- free spaces surround volumes monotonously</li> <li>- Observation is possible only in one direction. Access for both rows</li> <li>- Small blocks with two rows, 5 to 7 houses</li> </ul>	<p><b>Sheikhhdad transitional district</b></p> <ul style="list-style-type: none"> <li>- Free spaces contain volumes to some extent monotonously and irregularly</li> <li>- Access to new regions in both rows and in old regions in main and subsidiary alleys</li> </ul>	<p><b>SheshBadgir historical district</b></p> <ul style="list-style-type: none"> <li>mass construction of yarded houses</li> <li>- free spaces are divided via thin and wide connecting paths</li> <li>- connecting routes are irregular</li> <li>- observation is impossible</li> <li>-access: principle and subsidiary alleys</li> </ul>

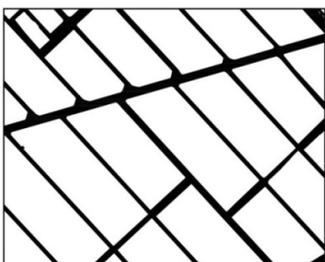
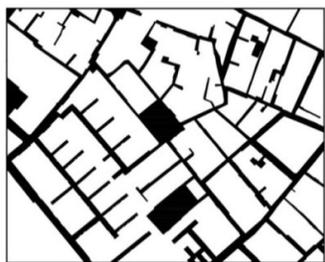
Figure 2. studies on the structure of Yazd city, free spaces, source: author

Mass distribution

 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Directed volumes</b></p> <ul style="list-style-type: none"> <li>- Volumes are in space in a regular and reproduced manner. Thus, orientation is vertical.</li> <li>- South western orientation</li> </ul>	<p><b>Non-directed and directed volumes</b></p> <ul style="list-style-type: none"> <li>- Volumes in new regions exist in regular and reproduced form.</li> <li>- volumes in historical regions are irregular and reproduced in space. The orientation is vertical.</li> </ul>	<p>Non-directed volumes</p> <ul style="list-style-type: none"> <li>- volumes situated in space in an irregular manner</li> <li>- non-similar orientation of free space</li> </ul>

 <p>SAFAIIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Directed volumes</b></p> <ul style="list-style-type: none"> <li>- Volumes are in space in a regular and reproduced manner. Thus, orientation is vertical.</li> <li>- South-north orientation</li> </ul>	<p><b>Non-directed and directed volumes</b></p> <ul style="list-style-type: none"> <li>- Volumes in new regions exist in regular and reproduced form.</li> <li>- volumes in historical regions are irregular and reproduced in space. The orientation is vertical.</li> </ul>	<p>Non-directed volumes</p> <ul style="list-style-type: none"> <li>- volumes situated in space in an irregular manner</li> <li>- non-similar orientation of free space</li> </ul>

Streets and routes

 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Directed access:</b></p> <ul style="list-style-type: none"> <li>- routes are in line and perpendicular to height lines.</li> </ul>	<p><b>Directed and non-directed access:</b></p> <ul style="list-style-type: none"> <li>- in historical part, direct communications between important points cause growth of a network of ways.</li> <li>- in new district routes are in line with and perpendicular to height lines.</li> </ul>	<p><b>Non-directed access:</b></p> <ul style="list-style-type: none"> <li>- direct communications between important points cause growth of a network of routes</li> </ul>

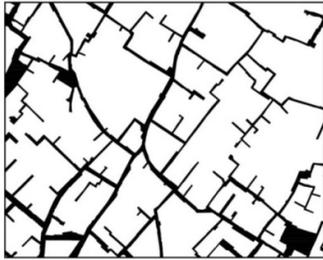
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Directed access:</b></p> <ul style="list-style-type: none"> <li>- routes are in line and perpendicular to height lines.</li> </ul>	<p><b>Directed and non-directed access:</b></p> <ul style="list-style-type: none"> <li>- in historical part, direct communications between important points cause growth of a network of ways.</li> <li>- in new district routes are in line with and perpendicular to height lines.</li> </ul>	<p><b>Non-directed access:</b></p> <ul style="list-style-type: none"> <li>- direct communications between important points cause growth of a network of routes</li> </ul>

Figure 4. studies on the structure of Yazd City, streets and routes, source: author

Blocking

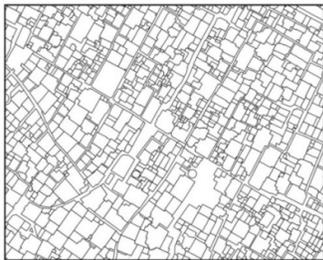
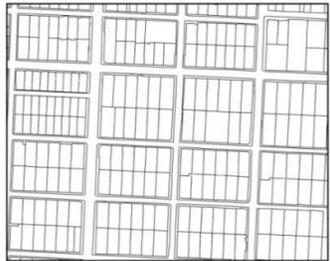
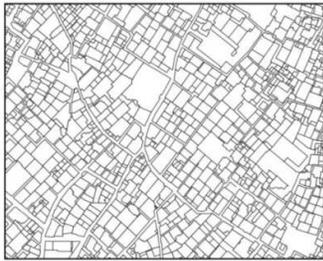
 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Vertical blocking:</b></p> <ul style="list-style-type: none"> <li>- similar ratios, lands are perpendicular to access pivot.</li> </ul>	<p><b>Regular and irregular blocking:</b></p> <ul style="list-style-type: none"> <li>- there are similar ratios in the new district.</li> <li>- lands are perpendicular to access pivot, unequal classifications in historical region show different bequests.</li> <li>- different exploitations of different dimensions of land can be distinguished.</li> </ul>	<p><b>Irregular blocking:</b></p> <ul style="list-style-type: none"> <li>- irregular blockings show different bequests.</li> <li>- different exploitations of different dimensions of land can be distinguished.</li> </ul>
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Vertical blocking:</b></p> <ul style="list-style-type: none"> <li>- similar ratios, lands are perpendicular to access pivot.</li> </ul>	<p><b>Regular and irregular blocking:</b></p> <ul style="list-style-type: none"> <li>- there are similar ratios in the new district.</li> <li>- lands are perpendicular to access pivot, unequal classifications in historical region show different bequests.</li> <li>- different exploitations of different dimensions of land can be distinguished.</li> </ul>	<p><b>Irregular blocking:</b></p> <ul style="list-style-type: none"> <li>- irregular blockings show different bequests.</li> <li>- different exploitations of different dimensions of land can be distinguished.</li> </ul>

Figure 5. studies on the structure of Yazd, blocking, source: author

Area statistics

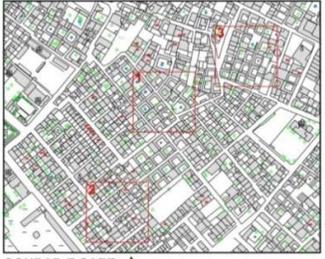
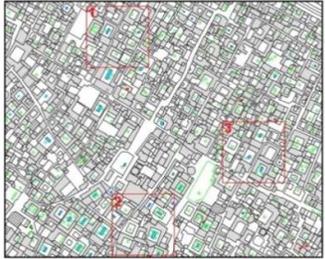
 <p>AZADSHAHR</p>	 <p>GONBAD-E SABZ</p>	 <p>FAHADAN</p>
<p><b>Average compression</b> Lands are built more than 50%.</p>	<p><b>Different compression</b> Lands are built more than 65%.</p> <ol style="list-style-type: none"> <li>1. 65%</li> <li>2. 70%</li> <li>3. 60%</li> </ol>	<p><b>High compression</b> Lands are built more than 70%.</p> <ol style="list-style-type: none"> <li>1. 72%</li> <li>2. 70%</li> <li>3. 69%</li> </ol>

Figure 6.studies on the structure of Yazd City, area statistics, source: author

Direction

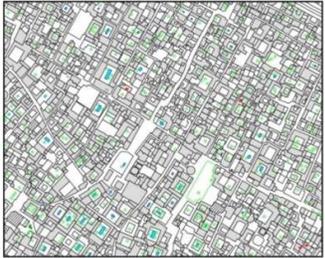
 <p>AZADSHAHR</p>	 <p>GONBAD-E SABZ</p>	 <p>FAHADAN</p>
<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>	<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>	<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>
 <p>SAFAIIEH</p>	 <p>SHEYKHDAD</p>	 <p>SHESH BADGIR</p>
<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>	<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>	<p><input type="checkbox"/> Buildings are immediately close to access. <input checked="" type="checkbox"/> All volumes are away from street.</p>

Figure 7.studies on structure of Yazd city, direction, source: author

Buildings edges

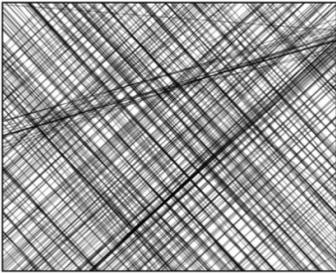
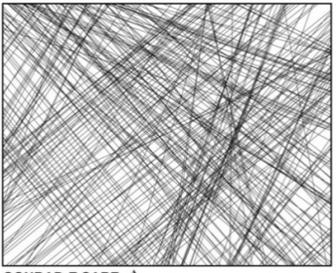
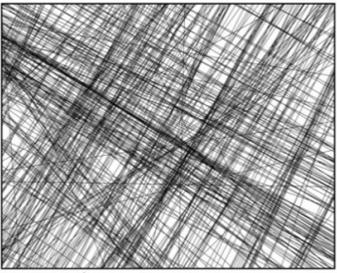
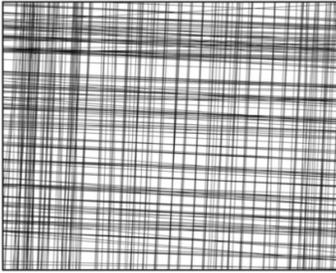
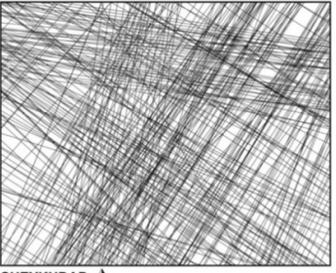
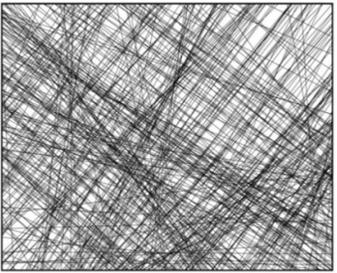
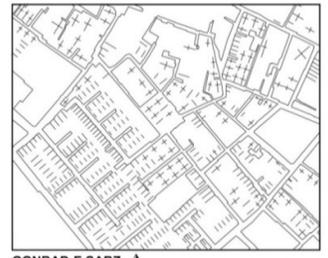
 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Monotonous network</b></p> <p>Edges of volumes are parallel to each other and form continuous rows. Free spaces and volumes of buildings are combined with each other.</p>	<p><b>Directed-non-directed structure</b></p> <p>Free spaces and construction pivots are not clear. Edges of space and rows are not formed. A spatial inhomogenous shape forms. Mass construction can be distinguished.</p>	<p><b>Non-directed structure</b></p> <p>Free spaces and building pivots are not clear, space edges and rows does not form. An inhomogenous spatial shape forms. Mass construction can be distinguished.</p>
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Exact-monotonous network</b></p> <p>Edges of volumes are parallel to each other and form continuous rows. Free spaces and volumes of buildings are combined with each other.</p>	<p><b>Non-directed structure</b></p> <p>Free spaces and construction pivots are not clear. Edges of space and rows are not formed. A spatial inhomogenous shape forms. Mass construction can be distinguished.</p>	<p><b>Directed-non-directed structure</b></p> <p>Free spaces and building pivots are not clear, space edges and rows does not form. An inhomogenous spatial shape forms. Mass construction can be distinguished.</p>

Figure 8. studies on the structure of Yazd, buildings edges, source: author

Building edges

 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Homogeneous structure</b></p> <ul style="list-style-type: none"> <li>- buildings are developed parallel to access.</li> <li>- in some places, buildings also respond as direction of buildings access changes.</li> </ul>	<p><b>Inhomogeneous structure</b></p> <ul style="list-style-type: none"> <li>- due to different construction period, non-directed, parallel and perpendicular volumes are existing.</li> </ul>	<p><b>Inhomogeneous structure</b></p> <ul style="list-style-type: none"> <li>- reason for orientation and relations is not obvious.</li> </ul>

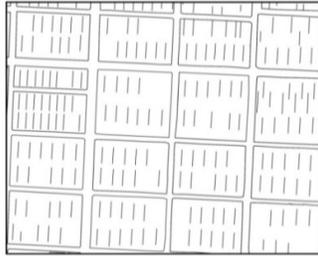
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Homogeneous structure</b></p> <ul style="list-style-type: none"> <li>- buildings are developed parallel to access.</li> <li>- in some places, buildings also respond as direction of buildings access changes.</li> </ul>	<p><b>Inhomogeneous structure</b></p> <ul style="list-style-type: none"> <li>- due to different construction period, non-directed, parallel and perpendicular volumes are existing.</li> </ul>	<p><b>Inhomogeneous structure</b></p> <ul style="list-style-type: none"> <li>- reason for orientation and relations is not obvious.</li> </ul>

Figure 9.studies on the structure of Yazd city, building directions, source: author

Direction, divided volumes

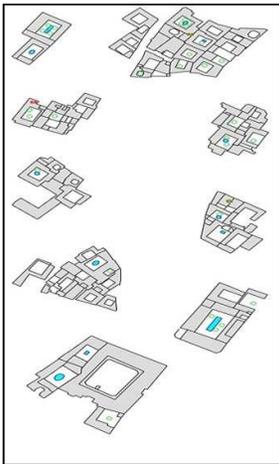
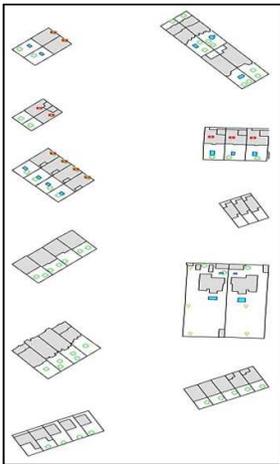
	
<p><b>Historical district</b></p> <p><b>Asymmetric division</b></p> <p>Buildings are usually divided asymmetrically and there is access from different directions, buildings are multidimensional and in line with surrounding space.</p> <p>A piece of land belongs to each side.</p> <p>Three different volumes: small, average and large dimensions</p>	<p><b>New districts</b></p> <p><b>Symmetric division</b></p> <p>Sections with spaces symmetric pivot</p> <p>Direction of accesses shows features of new regions.</p>

Figure 10.studies on the structure of Yazd city, direction, divided volumes, source: author.

District

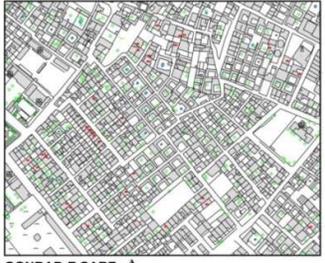
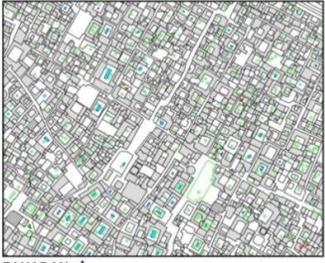
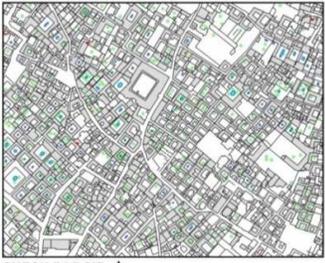
 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Integrated separation from neighboring house</b></p> <p>- due to monotonous shape of lands, homogeneous separation from district is occurred. A small eye contact with direct neighbor in a row of houses</p>	<p><b>Differentiated separation from neighboring house</b></p> <p>- different distances and angle of volumes with respect to each other create different external space features.</p> <p>- regions attached to each other and private around houses (grey) and also semi-public passages in remaining middle spaces</p>	<p><b>Differentiated separation from neighboring house</b></p> <p>- due to diversity of shapes of lands, an inhomogeneous separation of the neighboring house takes place. Sometimes, there is minimal eye contact between neighbors.</p>
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>Integrated separation from neighboring house</b></p> <p>- due to monotonous shape of lands, homogeneous separation from district is occurred. A small eye contact with direct neighbor in a row of houses</p>	<p><b>Differentiated separation from neighboring house</b></p> <p>- different distances and angle of volumes with respect to each other create different external space features.</p> <p>- regions attached to each other and private around houses (grey) and also semi-public passages in remaining middle spaces</p>	<p><b>Differentiated separation from neighboring house</b></p> <p>- due to diversity of shapes of lands, an inhomogeneous separation of the neighboring house takes place. Sometimes, there is minimal eye contact between neighbors.</p>

Figure 11. studies on the structure of Yazd City, district, source: author

Distance of buildings:

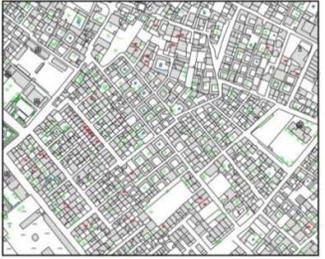
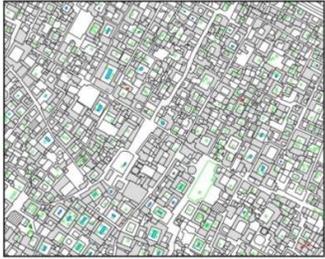
 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>Building rows</b></p> <ul style="list-style-type: none"> <li>■ <b>Small links</b></li> <li>- Row-like spatial simple shape</li> <li>- mostly different from jobs and stores.</li> </ul>	<p><b>Width and thinness</b></p> <ul style="list-style-type: none"> <li>- a system full of small and large distances, thin and wide alleys to small very thin alleys</li> <li>- yards are usually private, some part semi-public</li> </ul>	<p><b>Width and thinness</b></p> <ul style="list-style-type: none"> <li>- a system full of small and large distances, thin and wide alleys to small very thin alleys</li> <li>- yards are usually private, some part semi-public</li> </ul>

Figure 12.studies on the structure of Yazd city, distance of buildings, source: author

Position

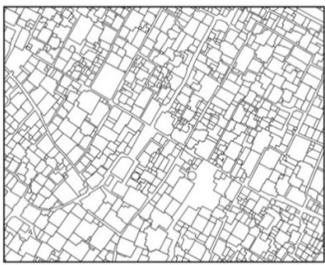
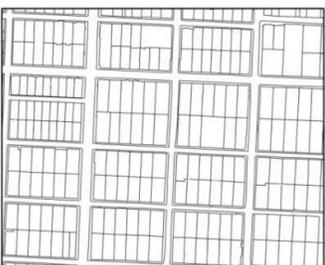
 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>	 <p>FAHADAN ▲</p>
<p><b>vertical classification</b></p>	<p><b>Thin/wide access</b></p>	<p><b>Thin/wide access</b></p>
 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>	 <p>SHESH BADGIR ▲</p>
<p><b>vertical classification</b></p>	<p><b>Thin/wide access</b></p>	<p><b>Thin/wide access</b></p>

Figure 13.studies on Yazd city, position, source: author

Situation of building in plot

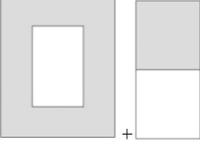
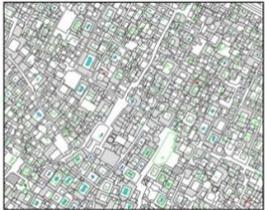
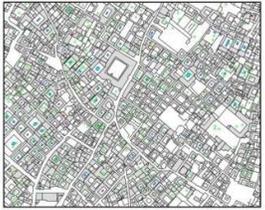
		
<p>- surroundings of plot exists based on yarded house principles. - the building is surrounded in all directions or three directions as a result of alley.</p>	<p>-out-of-center position - on one hand close to plot</p>	<p>- mixed and different position</p>
 <p>FAHADAN ▲</p>	 <p>AZADSHAHR ▲</p>	 <p>GONBAD-E SABZ ▲</p>
 <p>SHESH BADGIR ▲</p>	 <p>SAFAIEH ▲</p>	 <p>SHEYKHDAD ▲</p>

Figure 14. studies on Yazd city, position of building with respect to plot, source: author

**Conclusion**

A comparison of different parts and textures of Yazd city revealed that traditional architecture of old districts completely agree with principles of sustainable architecture. Modern interventions like establishment of urban complex plans, passages widening projects and so on have had undesirable impacts both in buildings architecture level and in spatial structuring of arid cities. Some negative outcomes include emergence of buildings which are not compatible with arid climate of the cities and harming environment and destruction of farmlands as a result of waste development of cities within the framework of low-compression developments. However, these textures can be saved from annihilation by means of aforementioned solutions. These solutions help improve sustainable development and return the missing identity of such cities.

Further, a comparison of these models and patterns revealed that each model has its pros and cons which can complete each other. Design of new and modern districts is not appropriate and they are considered as separated districts by citizens. Therefore, it is necessary to include positive features of models and integrate it with city main structure.

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