

## **Analyzing with SWOT method on traditional desert houses spatial structure against earthquake disaster (Arabs set buildings as case study)**

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**Abstract:** Earth quake is a dangerous event that kills lots of humans and leaves horrible economical & financial damages every year. The seat of Iran on world earth quake hazard zone, clarify the sensitivity of security issue confront these unpredictable disaster. Most of the desert cities of Iran have traditional texture that involved historical buildings so access to open safe area is too important for scrapping and guarding. Therefore this issue attempted to investigate of harm resistance of special structure of traditional houses against earth quake, by ARABS set of buildings in Yazd as a case study. As regards access to open safe area during of crisis specially earth quake disaster, and supply services either in limited time is so survival. Therefore less accessibility problems and its ruination probability make a serious hazard. This paper with propose of catching the pattern for resent residential units, investigated briefly to adequate of open area of traditional residential units (equal of neighborhoods in new definition) and approachability to these open safe areas tile crisis. In this issue also consider about its complex relationship among the spaces & rooms because of specific centralistic structure, accentuate on safety and security foundation with analyzing data that based on gathering with statistical and experimental methods, by SOWT methodology and verifying spaces with adaptation information. In conclusion, as result of this issue spatial arrangement of this traditional house, consideration of its coordination and dimensions, intrinsically reduce damages financially and physically of earthquake in crisis time and increase the escape time and improving the quality of humans life.

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### **1 - Introduction**

Desert cities with its traditional body of the mysteries of human evolution before the eyes of every person to live show and This fact proves that due to persistent intelligence and creativity in applying traditional methods to suit the environmental conditions, Have historic context for hundreds of years to protect against accidents. Iranian homes because of family and general Their old and during the long years of sedentary human evolution to date contain many values from the perspective of architecture and urban design And the desert cities of Yazd, Iran has been able to survive as well as document the invaluable treasure in the desert preserve. Like other parts of the city of Yazd, Iran's position on the belt Earthquake and adjacent to the major faults, such as pomegranates and Dehshir of medium seismic has risk. Therefore the traditional human tissues over thousands of years, the way to overcome the problems of living peacefully with nature and learned, And surprisingly annoying aspects of it with a simple way to change your comfort is more important than ever to make. Interconnected open spaces and fluidity significant interference with the use of specific proportions of space, suggest human desire to live in nature Space is

full of life and vitality in the Iranian traditional houses is seen in the composition space. The structure of traditional buildings, even human destruction and pillage and genocide still remains and will always remember the human collective mood of the ashes like a cage, another birthday and Each stand has beautiful More meaningful past., But man machine age technology and sadly, the ancients monuments dating back to the life of humanity is born of experience, aside and Rapid to nowhere called his Rationalism Gallop and the invalidation of all experiences and oral generations of our ancestors have ever been.

This paper uses the field in the areas of (a family of Arabs) It also utilizes an assortment of documents and books and shared spaces in these buildings, the space proportions in terms of application, the time duration To analyze the level of risk they are using has been sowt table.

Earthquake activity has taken place in many books, articles and many articles have been published and In case of earthquake disaster management conferences have been held in historical contexts, but most research has been conducted, with a view of the high vulnerability of these buildings and Often seek to reduce risks of fixed bodies have less to look at the

buildings and their potential survey research has been the secret of their stability.

## 2 - Materials and Methods

Investigation based on descriptive-analytical information and data required based on documentary studies, library and field. The main instrument used to gather data, questionnaire and interview. The studies are expected to desert traditional houses against earthquakes, will be analyzed and In the end the SWOT analysis techniques are used to achieve the research findings and recommendations.

## 3 - Theoretical Framework

### 3-1 - Earthquake effects

According to experts, the earthquake crisis in seven different factors influencing factors can be assessed the weighting of each of these factors can be identified vulnerability, these factors include:

1 - Identify the nature of the terrain, topography, slope, soils and bedrock type, distance from faults and etc.

2 - The urban Username: Username switching places, and adjacent to, the radius of influence and access.

3 - Population density and hours of Place: Human and Household net density of housing units and their relative structure.

4 - Density construction, infrastructure, number of classes, and they occupied.

5 - Old buildings and their approximate ages, materials, and technology used in building construction.

6 - Network communication: physical properties, types, and number of hierarchy and their permeability.

7 - Open spaces: physical properties, depending on the surrounding areas, open spaces and access to their hierarchy, and leverage the openness and the size of the openings to the spaces and places of influence (Bahrain, 1375, 154)

Although these factors have mutual influence on each other, but because of the brevity and relevance to the topic of this paper is on proving the hypothesis, the end of two factors, explains:

### 3-2 - The structure of traditional Iranian cities

The historic cities of physical space preserved on the links or complete a series of enclosed spaces with a heterogeneous territory is formed by the human scale. The enclosed spaces and heterogeneous city would be divided into three categories:

A) Continuous or linear spaces including markets, four gardens, original tracks, subtitle tracks, alleys, dead-ends and awning.

B) Confined spaces or in part, including city squares, Square neighborhood, porch and interior courtyards that among these endorse the neighborhood unit, and is usually set and At the smallest scale, endorse openness as a

way to enter a space in the path of one or more home and Joint space was used as a residence, and sometimes a space opens on the road, or crossing them and or in front of a public building or neighborhood home has been reliable persons.(Rashtian, 1383,98)

C) Sometimes these two types of space if they combine together to create a closed space such as corridors are often drawn and As a semi-private area - semi-public access and location of persons residing in the same location used by residents in the community conversation (Sultan Mohammad, 1370,176). Family set of input clauses and are of such spaces.

Organizing a series of housing units in traditionally consists of a number of housing units to be built adjacent to and contiguous in physical form Can also be set to be viewed as a structural unit. In addition to the group by a member of the house by way of a detailed transition elements are linked together (Continuous coherent architectural framework - Structural and functional relationships within the organization). This sets the number of units within the private realm of family-oriented, with the same performance and physical characteristics in common, such as introspection (Co-organized layout), for the same quality, the same relationship between inside and outside space of sequences and explain the visual quality of the joint is formed (Ghaffari, 15,16,28). In general, such a nuclear structure dependence on residential neighborhoods and ethnic relations, religion, accompanied by a sense of altruism and generosity, creating relations, the Spatial arrangement of the elements surrounding the central space between spaces with hierarchical forms of access, with an emphasis on privacy, security and familiarity are residents of particular and type of communication easy and impossible spaces and their own identity, this series brings history. Quick links to open spaces including a variety of communication features that are in the spirit of history in this space is left.

### 3-3 - Optimal and efficient access to the features of small scale

In general, residential groups have access to safe place must be within 100 to 150 meters per minute and a maximum of m and 1 to 2 minutes and In this case, the open spaces are considered as yard or garage collective. Routes, access and communication solutions under stairs, the hallway leading to the open spaces and streets with walks in the corridors of the underground and rooftop communications are defined and Minimum width of 90 cm and in the streets, walk up the stairs 3.5 m is defined and Its length should not exceed 6-9 meters and a minimum width to height ratio equals 1 is wall (Bahraini, 1383, 257)

In addition to the above physical proportions of these routes should have the following features? Staircase located in the heart of the relationship of space and easy access, it is possible.

Side walls, stairs should be robust and rugged material, and lined the entire route should not be used to damage.

At the same time opening up access to windows and other closely.

Multiple inputs and outputs is possible. The communication paths have easy access to public open spaces and trails rides fast by following the provided hierarchy.

Electrical installations must comply with privacy and coatings, water, gas, etc. should be observed carefully when the risk not to be disturbed.

Permitted levels of 9-6 meters along the road to a maximum of two stories (Improvement and Modernization Committee, 1367, 12)

So in conclusion optimal routes are routes that have: 1 - Safety 2 - short (time and place) 3 - chunky (a mind) and 4 - readability (comprehension location) that can best meet the needs of residents in times of crisis is set (partoii, 1372, 58). So enjoy the space above meant to ensure the safety and performance standards for access are desired.

#### *3-4 - Openness and standards compliance*

Open spaces play an important role in reducing the extent of surgery and the results are most natural and artificial. The main functions of the earthquake, To separate one area to another and thus potential risk of localized destructive forces and prevent the development and function of the chain. It also can open area available in emergency situations as a chance to escape and seek refuge in the settlement. The design of urban open spaces within the tissues of an important tool for dealing with risk is considered. Usefulness of open spaces in urban areas depends on the number and distribution of these spaces in urban areas (Hamidi, 1378, 153) Open Space (OS) is the total area of open space (Horizontal surface of the earth by the space that is not occupied by buildings, but it was closed, and the two sides are at least 50%) (Azizi, 1382, 25) Therefore, classifying land uses, open spaces and streets, but no servers to a body.

Group dedicated to open standards such housing is defined in the courtyard or parking a mass scale open spaces are proposed and Maximum occupancy is 50% of the building in its scale but for building a two-sided, three-sided and four-sided traditional context, to the maximum 65%, 70% and 75% is defined and This amount will be reduced in height But in all these open spaces shall have a minimum capacity of 80-40 cars And on the other side of the parking area at least equal to the standards required 1600-800 meters (Improvement and Modernization

Committee, 1367,41)

Yard dimensions in the absence of durable materials to be used must be a minimum of 1 yard to the length of the altitude to escape from danger, be accountable and Moreover, rapid access to the roadway network. While the focus has been residential groups and also from any direction is good readability the flexibility of these spaces is necessary so that there is space and the ability to perform various activities (Bahraini - masaeli, 1375, 257)

#### *3-5 - static and dynamic spaces*

Static and dynamic properties of confined spaces, to give space to place credentials. Dynamic space equal to 1:2 or 2:1 ratio of width to height and space is static and Width to height ratio of 1:2, it is idle to be 1:6 (Tavassoli, 1368, 56). According to the most traditional courtyards in houses and in particular the collection of family(According to the schedule fit) has inherent potential for static and dynamic atmosphere for the room and the surrounding areas and Tension inherent is the center of gravity and the stability of the yard and the space is considered a safe atmosphere. The natural properties and internal tension is a good thing for the environment is stable and less dangerous position where the gravity of the new construction less the point of today and Often the quiet residential areas and rooms within the building itself, which is a symbol of isolationism and modern human individuality, which is cut off from nature and nature.

4 - How to layout spaces and the risk in a family of aristocratic Arabs

This section deals with the analysis of Yazd family of spaces will measure risk in time of crisis.

Arab family in relation to several case series, 1 - Corridors and Unit 2 - vestibule, 3 - and 4 Communication is the roof spaces, such as the organizational chain ring connects all the different forms of the same.

Residential open spaces often have two rooms connected by corridors of access to inputs and indirectly by the door and Eros. And often more than 2 meters deep in the corridors and they will make it easier to access. Here has been a part of the great family of the Arabs.

This is an open space layout around courtyards. It is worth noting that the areas of communication, including stairs, corridors, corridor, vestibule and etc.

Services include server and storage spaces, closets, pool house, kitchen, stables and more. If there was a study done by the following physical proportions spaces.

#### **5 – Analysis**

In this section we examine the strengths and weaknesses of the data and swot table. This table will help us have a better understanding of complex

spaces with Identify internal strengths and weaknesses and identify opportunities and threats posed by external factors, the risk of earthquake in this space.

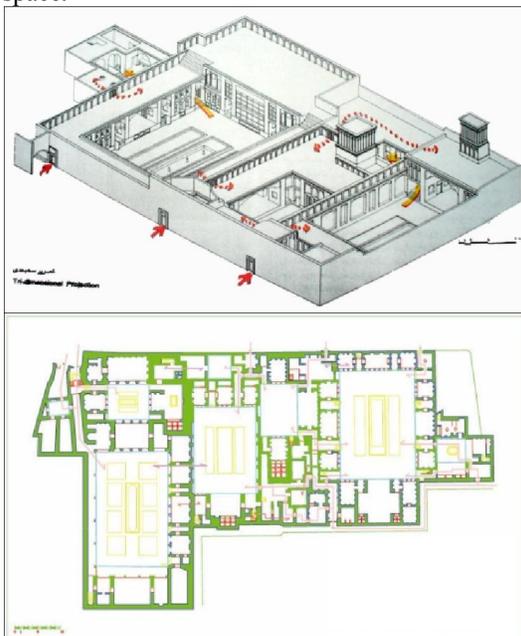


Figure 1: Map of space communications by Arabs (Ganjnameh, 1383)

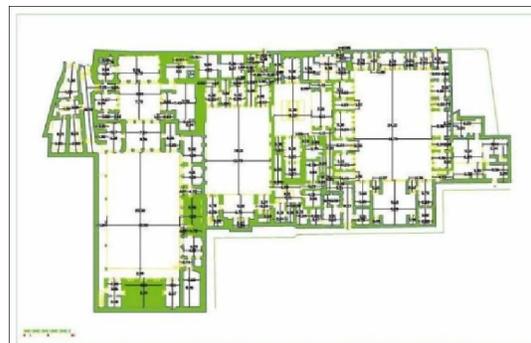


Figure 2: Plan for the proportions of Arabs

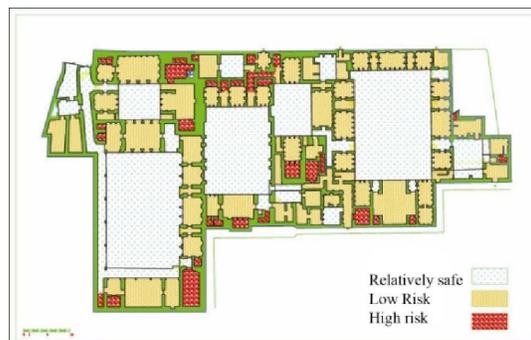


Figure 3: Arabs set of risk areas

Table 1: The relative proportions of the spaces Arabs

Body proportions	Height to width	Length to Width
Proportions yard	0.33-0.41	1.53
Average proportions of surrounding rooms on the Eastern Front	1.15	0.64
Mean proportions of rooms surrounding the Western Front	0.69	0.58
Mean proportions of rooms surrounding the northern front	0.86	0.87
Average proportions of surrounding rooms on the southern side	0.89	1.30

Table 2: Analysis of the earthquake using the technique swot

Type the username spaces	Strength (s)	Weaknesses (w)	Opportunities (o)	Threats (t)
Residential rooms in East and West	Multiple open access to the yard In order to achieve the appropriate proportions and rational dynamics (Chambers Eastern over Western Room) rooms shallow Multiplicative structure or roof vault Springs has good resistance against earthquakes Eros inputs and high strength due to the composition, structure and distribution divisions of troops	High heat exchange with the outside atmosphere and the chance to take advantage of space time	Immediately adjacent to the yard Spaces for 24 hours (preferably overnight) Concentration of activities of daily living in the spaces Allowing quick unloading at any time of the day to secure space in case of crisis	The quality of the spaces in the cooler months years Possible additions, including shelf and hanging down in times of crisis Human density in these spaces.
Dining Rooms	Greater height than other rooms for the firm and the relative balance Static's and dynamics in space More arch roof and better stability against earthquakes Multiple access in space	Deep-space Decorated	The central position of the element in the yard Occasional use of space Allowing quick unloading at any time of day or night.	Components are likely to fall further during the crisis

Closet	High dynamic space Specific proportions of the space in order to increase the strength relatively safe	Depth High availability Lack of diversity in access Top Closure	Seasonal use The Case for Space Most of the time of day is not that people have less awareness	Very high probability being imprisoned in a time of crisis in the spaces
Hall	Unhindered access to open space High ceilings Placing among the semi-enclosed spaces and	Deep-space Height of the yard	Specified in the applicable hourly or seasonal space Possible, seek shelter in its shade in danger	Windward is situated mostly in the posterior part of the hall and down the hall there is a possibility in case of crisis
Predominantly	The spaces between the arches are fitted with high seismic resistance.	Ease of access to open space	High strength is mainly due to the exposure of the courtyard where the margins are the main focal point of the building foundation	There is a possibility of collapse or shut down the stairs and locked in a time of crisis
Kitchen	It was large space, but the positions have been divided into small spaces Robust	Limited Access Shelf presence, and other additional elements create a safe space architecture in times of crisis	This space is for only certain hours of the day is to see that people have a good awareness	Located in the posterior part of the core structure of the confinement probability increases in risk
Pool house	Following are thick columns and the strength of the wind structure around the space.	Located in the Windward	Seasonal & users of the space.	In case of earthquake, wind riskiest space due to collapse probability
Windward		Riskiest structures due to high		The possibility of being thrown into the open spaces and the creation of all
Basement	Due to the structural stability of the walls on the ground	The roof of a large, load-bearing structure on the space Limited Access	In some cases you can use as a central access	In case of loss of access will be confined in space
Barn and stables	Spaces located adjacent to Main Road	Spaces with high degrees Closure	User space is limited	Strong probability the loss of livestock and food stock due to high Closure
Hallway and staircase	Multiplicity and diversity of access (roof, ground and underground) High spatial dynamics Strength of the spatial structure of the form	Very high degree Closure More in some cases illegible and Maze	Ability to use a variety of different ways in which the crisis	Stairs located in the blind spots in times of crisis is to increase the likelihood of obstruction.

According to the above tables can be classified in terms of their spaces and the area of risk involved, many of the subgroup and examined the vulnerability of each of these spaces.

Table 3 - Risk analysis the appropriate type space

Type spaces	Safe	Low Risk	High risk	Total
Residential	0.00	795.51	54.02	849.53
Servers	25.77	149.11	126.06	300.94
Relationship	119.75	157.66	145.96	423.37
Campus	144.29	0.00	0.00	1441.29
Total	1586.81	1102.28	326.04	3015.13

According to the table above for boarding had mostly residential areas are mainly in the low-risk range and Service spaces are occasionally used, are located in the posterior areas with high risk. Discussion focused on access and communication environments, which are often in the range of high and low risk. Firstly it should be noted that in times of crisis is less need to use these spaces. And secondly, after the crisis of the residents, the environment will not be locked due to accessibility and diversity and will be maintained by other arteries of life in residential building.

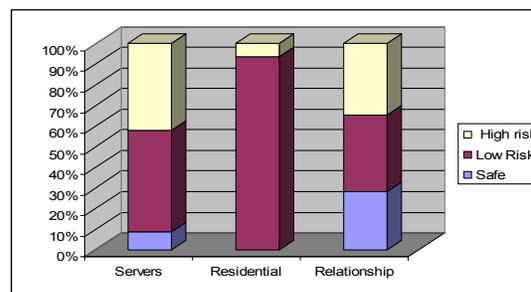


Figure 5 - Risk of spaces to suit the type environments

Because of the sensitivity of a 24-hour space, as mentioned previously, due to the lack of predictability of crisis. For example, if events occur at night when people are sleeping less opportunity to save their lives because of lack of consciousness and this will make more space.

Spaces that are used only in certain times of the day because people are generally full consciousness and can be seen danger signs before the crisis to reach safe areas. Another view of the open space can be seen as static and dynamic spaces in the peripheral areas. On average, a ratio of 2:1 and 3:1 all the spaces between the proportions of height to width that is reasonable and appropriate for the wide open spaces of dimensions.

The communication spaces that are smaller, the minimum height to width is 1.5 to 1 ° C to obtain 0.66 Closure. Often these spaces are rarely seen and are most at risk of Closure. If more than 1, otherwise the high risk and low risk will be considered. This length is directly related to the access and the maze. According to data obtained from the sample, the maximum amount of space available in a range of high and relatively safe places, to have the least amount. And given the relatively high throughout the maze of this complicated maze of corridors and access routes, the possibility of escape and refuge in times of crisis through the complicated maze of corridors that seem illogical. But the solution to this problem is in how the layout open spaces, among other places. Residential spaces and 24-hour clock are often used around the open spaces (which corresponds to what can be described as relatively safe area) are not too much depth. The average depth of about 3 meters in front areas of Eastern and Western fronts of about 4.5 m with a height of approximately 4 meters and an average depth of space south side, approximately 4.5 to 8 m. And a height of about 4-7 m and an average depth of approximately 3-6 m spaces northern side and the height of 4-5 meters, with communication. Immediately yard are all less than 1 degree Closure that the relatively low depth (Where the depth is greater than the height increases). During the 24-hour flight and refuge space increases and puts in place a low risk. It is worth noting that a relatively high ceiling height due to increased structural strength and increased time to escape in times of crisis would.

In a formal comparison of existing and new residential construction, contractors, and designers who are trying to be seen. Spaces in which they sleep for 24 hours and boarding houses in outlying areas with difficult access are dangerous degree Closure. Including how to access and limitation due to the high number Closure often exacerbate insecurity and

Sometimes a problem will add to the high altitudes over which individuals have to go through it to get to the outdoor. If blocking the passageway of communication in most cases, the escape route is blocked, and they are trapped inside the building and in this case the increased risk of Johnny. Often such building or addition to this, there is no outdoor private or not-so-safe. So people have to use public open spaces such as alleys and streets in the form of Islamic religious culture of our people, especially women, will spend some time had to maintain good cover. In the second, decisive, and may be unsafe to the person and those around him could cost lives. If the old buildings, open spaces are also available to facilitate quick and easy, no need to keep the veil. And the body of the house, her veil was a resident of this state, as well as the size of things, it is efficient.

## 6 – Conclusion

If you ever talk to the brick and adobe buildings comes quickly fatigue and lack of safety in public spaces, to appear. Physical aging, weathering and dust on the body during sitting and restoration of these buildings have occasionally done some unethical. Although the buildings are weaker and more vigorous. But the structuralism view of these spaces and their arrangement relative to each other, we found that people wear in the Old time rich experience is as old as human history. The aim of this study was to investigate risk areas of the traditional houses in terms of the spatial layout and the ability to respond in times of crisis. As well as other parts of the city of Yazd in Iran because of the exposure on the earthquake belt and adjacent to the major faults, such as pomegranates and Dehshir, is of moderate seismic risk. Therefore, it is important to have space available for safe refuge and escape today we can finally get a blind imitation of Western and International methods ax to their roots and identity, three thousand year's doomed to resign ourselves to the wind.

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