

The Impact of Climate on Ecological Design of Semnan City in Iran

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How to cite this paper: Joodaki, H. and Tahmasbizadeh, H. (2018) The Impact of Climate on Ecological Design of Semnan City in Iran. *Open Journal of Ecology*, 8, 1-14.

<https://doi.org/10.4236/oje.2018.81001>

Received: August 16, 2017

Accepted: January 8, 2018

Published: January 11, 2018

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Abstract

Ecological design is defined as any form expression that minimizes environmentally destructive impacts by integrating itself with living processes. Ecological design is an integrative ecologically responsible design discipline. Layout of climate is one of the basics for the ecological design of Semnan. In this regards, the ecological design and the architecture of the city of Semnan are the means through which the city reinvents its identity and its structure and renews its face. Creating of healthy and restful occupant environments for human becomes one of the main infrastructure challenges upon modern ecological design and architecture which provides human health. Undoubtedly, there are also reasons for being optimistic upon the level of physical and mental wellbeing of individuals, reducing the incidence of diseases, and/or might reduce their total fuel consumption with adverse health effects, and environmental pollution. In the climate-related topics, the architecture of the building is considered with the climatic conditions of each region, which will result in more human comfort and energy saving in order to control the environmental conditions. The purpose of this research is to identify and review the architectural style and ecological design of the city in accordance with the climate and the climate guidelines that can be used in the areas of stability, comfort, beauty, health, energy efficiency, and the use of important climatic parameters (temperature, relative humidity, ...) extracted from the data bank of the Semnan Synoptic Station (1965-2005) and the Terjung Environmental Indexes. The thermal comfort conditions of the private and public bodies of Mahani and Givoni were reviewed and analyzed for the establishment of the buildings and seasons of the year. The results show that the weather is very cool at night in the months of March and October which are acceptable on the day in comfort area, and June, July and August are acceptable at the level of comfort in the city in the months of November to March in the day and October to March and in the months of April and May. Also, in the area of

energy consumption, buildings should be placed in the east-west axis; long openings in the north and south of the building should be reduced to the sun.

Keywords

Ecological Design, Climatic Conditions, Architecture, Givoni, Energy Consumption, Semnan City

1. Introduction

Sustainable development is organizing principle for meeting human development goals by the societies through good resource management and the development of human's desirable operation of this source makes the scientists use all human sciences as the main ways of achieving this goal. There is a major shift in behavior and activity as the environment of human life is surrounded by the atmosphere and most of its activities are done within this area [1].

Four elements play a fundamental role in shaping the climate zones in human comfort. These elements include temperature, humidity, wind and radiation. Among these climatic elements, temperature and humidity have profound effect on human health and well-being. Therefore, most human health assessment models have been based on these two elements [2]. Air flow rate has a direct effect on heat transfer in the form of displacement and evaporation. The faster the flow of air is, the higher the proportion of thermal equilibrium is in the form of displacement and evaporation. The average temperature of the surfaces in the environment can convert the heat exchange between the body and the environment in the form of radiation [3]. A less space will be used for housing where the climate conditions are balanced and appropriate for human life. In torrid areas, dwellings are built with thick and stable walls to protect its people against a great stream of wind and solar energy [4]. The most of executives have imitated the past architectural facades and called it as the traditional architecture [5]. However, the outward facade of old building has been used in the good construction area, the efficient, static and resistant materials to the impact and pressures on the building, the confrontation with the weather, the cold, and the atmospheric precipitation [6]. Of course, the culture of the region is also very effective in preserving the architectural elements of the building. Therefore, all of our traditional buildings in different countries have different architectural and construction projects, the various designs and a different type [7].

The orientation of the building can determine the amount of absorption of the sun's radiation. Building designers must choose the building orientation to calculate the charge of the sun at different times of the day and the different days of the year (which changes the location and angle of the sun) so that the amount of radiation absorbed does not cause excessive heat. In cold areas, the building orientation is selected so that the maximum absorption of solar energy can be absorbed [8]. Creation of comfortable and desirable conditions of life and secu-

rity of inhabitants is counting as the inalienable principles of architecture and building in the unfavorable conditions of the environment and atmosphere [9].

Throughout the history, man has been trying to adapt his environment in order to create a secure shelter for living, in order to create the right conditions for his life, and in fact, the geographical conditions, climate, and the formation of this living space, have direct effect on it.

In Semnan, due to its warm and dry climate, the architecture is in harmony; with the climate in such spaces, the indigenous materials are used with the least adverse impact on the environment. And reducing the amount of energy consumed by using local materials, has resulted in environmental sustainability and increased durability of buildings.

The present study is a guide for designing a climate map for urban planners in order to assist in the development of local housing architecture in this city, creating healthy atmospheres for energy conservation, and proposing designing of construction spaces, climate coordination, including physical form, establishment of the building, courtyard and facilities.

2. Methodology

Free space or outer space means a space that is directly related to the conditions and elements of the climate. In such a space, various climatic elements directly affect humans, such as sunlight, air temperature, humidity, air flow and rainfall, and the type of clothing, and its activity is the only factor separating the human body from environmental conditions [10]. The warmth and comfort of humans are directly linked to the body's thermal balance with the surrounding environment, which is determined by the two groups of environmental and individual factors. Environmental factors are the four factors including the climatic basis of temperature, humidity, wind and radiation, and individual factors are the level of activity and type of body covering [11].

In this paper, the methods of Olgyay, Terjung, and Mahani and Givoni have been used in order to study the climate and architecture in terms of comfort and energy consumption, the importance of the effect of each of the climatic elements in the thermal conditions of open spaces. In the text, each of them is clearly elaborated and calculated. Thus, the research method is documentation and statistical analysis.

3. Data Analysis

Before analyzing, we examine the situation and the climate of the case study.

4. Geographical Position of Semnan City

The city of Semnan is the center of Semnan Province which is located at 35 degrees and 33 minutes north latitude and 53 degrees 23 minutes east along the desert margin and on the slopes of southern slopes of Alborz Mountains. The altitude of this city is 1100 meters from the sea level and has a North-South gener-

al slope.

The city of Semnan is located in a vast plain, west of Tehran with 230 km, east of Damghan city, 107 km, and north of Mahdishahr and Shahmirzad cities about 25 km away. In studying the architecture of the Semnan climate, we refer to the city's housing architecture located on the central Iranian plateau, which has an intrinsic architecture compatible with this type of climate.

5. Weather Conditions (Climate)

The climate of each region is the result of time composition of the atmospheric and environmental elements of that area [12]. Considering the location of the city in the vicinity of the mountains and the plain, the local factors affecting the atmospheric conditions are of great importance: elevation, topography diversity and variation of altitude are the factors of climatic variation. The climate features of this region are “dry, dehydrated, intense summer heat”, wind blowing in different directions, and “extreme cold in the winter”.

Understanding the climatic factors can only be done by the measurements of the stations in the range. If Semnan is the most reliable station for studying the climate, it is the synoptic station. **Table 1** shows the characteristics of the station with details.

The study of climate conditions is carried out in which the impacts of urbanization, housing, and township can be clearly seen. Consequently, in the design process, we will come to some conclusions about the physical properties of the project in terms of its impact and its impacts on weather conditions.

6. Wind Rose of Semnan

In the study of wind status, the synoptic station of Semnan province shows that the north wind is dominant. The average wind speed is about 8 knots (4 m/s). Seasonal winds in Semnan indicate that the autumn and winter winds have a lower percentage and speed among the other winds, but the wind direction is important due to the coldness of the area and the importance of heating the spaces inside, because the region is cold, the wind direction is of great importance in addition to increasing the heat dissipation of the building. The reason is that the winds in cold areas will increase the fuel consumption of the heated building systems and is effective in reducing the tangible temperature in addition to heat dissipation. Summer and spring winds are faster in this city. If they blow from the side of the desert and dry areas will cause increasing the use of cooling equipment in the city, in addition to increasing the heat in the city (**Table 2**).

Table 1. Specifications of station near Semnan.

Statistical period	Longitude	Latitude	Height	Type of station	Station
2005-1965	52°34'	52°45'	11,308 m	Synoptic	Semnan

Source: Meteorological Organization of Iran, 2016.

Table 2. The wind speed and direction in Semnan city in the long run (1965-2005).

	April	May	June	July	August	September	October	November	December	January	February	March	Annually
Dominant direction	725	225	360	360	360	360	215	315	315	315	315	315	360
Dominant speed (knot)	88	88	10.7	10.1	9.1	8.6	6.5	5.6	5.3	5.2	6.7	6.7	8.3
Dominant percent	8.9	8.9	11.2	11.8	10.0	10.7	9.8	9.5	7.9	7.0	7.7	8.5	8.3
Dominant calm	55.6	55.7	54.2	53.7	58.4	57.7	67.5	71.2	77.7	78.6	7.6	67.6	63.1
Average wind speed (knot)	758	272	358	32	16	314	283	3.1	310	311	789	276	311

Source: author, 2016.

7. Study of Thermal Conditions in the Night and Day

From a climatic point of view and the basis of the formation of a residential environment, the human thermal comfort is for the provision of suitable environmental conditions for a better life. In other words, the purpose of climate studies is to create spaces that can be created with the use of minimum fossil fuels.

1) The human thermal comfort

A. thermal conditions in free space Olgay biogeochemical map is one of the criteria that show the role of effective phenomena in the sense of calm. Free space is a major part of the residential environment and is always part of the daily activities of human beings in these spaces. The purpose of human comfort is a set of conditions that is thermally suitable for at least 80% of the people [13].

This diagram determines the comfort range based on the two factors: relative humidity and temperature. In principle, the comfort level means that humans feel comfortable in the indoor and outdoor environment (about 0.1 m/s), while sitting outside the comfort zone, the person will not feel comfortable unless he or she takes steps to correct the heat situation. Following the transfer of information on relative temperature and relative humidity of Semnan station, the following results are presented.

- During April and October, the day is in the comfort zone, and the months of June, July and August are acceptable at night on the boundary of comfort.
- March, April and May (in the night), November, December, January and March are less than 20 degrees Celsius at night.
- June, July, August and September are hot and dry in the day conditions.

Dr. Kasmaei, based on the Olgay method suggested that Semnan is located in the group of eight climates and in a warm and dry cold zone. In this climate, extreme cold is so much in the coldest month of the year that, although using the sun's energy, it cannot create favorable conditions in open spaces, but in the summer, the climate is warmer than previous ones. In the warmest months of the year, it is not possible to create suitable heat conditions in open spaces by creating shadows and using air flow. The possibility of controlling free spaces naturally occurs at a non-floating hour.

2) Thermal conditions by the Terjung method

Terjung used this method to the US Bioclimatic classification. Terjung divi-

sion is based on the determination and use of two coefficients of comfort and the coefficient of influence of wind chill [13] [14]. To determine the comfort factor of day and night, two climatic parameters of temperature and humidity (minimum and maximum) are used to determine the predominant sensation under different conditions and different combinations of temperature and humidity, and in the conventional conditions such as normal cover and physical inactivity using the charts, Tables and symbols designed and developed for this purpose. In city climate it is necessary to calculate the city's thermal conditions at night and on different months of the year. In this method, the required parameters are: the minimum and maximum temperature (Fahrenheit), the relative humidity of the minimum and maximum, the average wind speed during day and night, and the total sunshine hours. The following table shows the parameters of the climate required (Table 3).

In this method, the thermal and daytime temperature of a separate hour is obtained according to the minimum and maximum temperature and the minimum temperature and minimum relative humidity in the diagram below. The concept of each coefficient is given in the following table.

In the city, in the months of November to March, the weather is very cool in the months of March and May and March and April. The months of June to August are nightly cold weather, April and October, have a state of desirable climate. Only June, July and August months are hot Climates (Table 4).

3) Mahani method

In the Mahani method, the weather conditions of the night and day of each month are related to the limits of human comfort in that particular month, and

Table 3. Climatic parameters of Semnan city in long term (1965-2005).

	April	May	June	July	August	September	October	November	December	January	February	March
Average maximum temperature (in Fahrenheit)	75	84.9	95.4	99.9	98.2	90.2	77.4	63.1	51.1	47.3	52	61.9
Average minimum temperature (in Fahrenheit)	53.4	62.8	72.7	77.7	75.4	67.8	56.3	44.2	34.7	31.3	34	42.4
Average relative humidity	26	24	19	20	21	21	28	37	47	48	40	23
Average maximum relative humidity	54	48	38	38	38	39	50	61	75	77	70	64
Average wind speed during the day	3.4	3.7	3.7	3.7	3.1	3.1	2.6	1.7	1.2	1.2	2	2.7
Average wind speed during the night	2.3	2.5	2.5	2.5	2.1	2.1	1.8	1.1	0.8	0.8	1.4	1.8
Sunny daylight	12	13	14	14.5	14	13	12	11	10	9	10	11
Total sunny hours per month	228.6	284.7	337.7	338.6	336.9	305	360.7	202.6	169.1	171.6	182.8	208.3
Average daily sunny hours	7.3	9.4	10.8	10.9	10.8	9.8	1.2	6.7	5.6	5.7	6	6.9

Source: author, 2016.

Table 4. Day and night comfort ratio in Semnan city.

	April	May	June	July	August	September	October	November	December	January	February	March
Day	Desirable	Warm	Hot	Hot	Hot	Warm	Desirable	Very cool	Very cool	Very cool	Very cool	Very cool
Night	Very cool	Very cool	Desirable	Desirable	Desirable	Cool	Very cool	Very cool	Very cool	Very cool	Very cool	Very cool

Source: author, 2016.

then, are presented with the help of it, the climate and, finally, appropriate suggestions. To do this, at first, the climatic statistics are set in the relevant tables and the daily fluctuations of the temperature and humidity group of the air are determined in each month as well as the annual and average annual fluctuations [15].

Table 5 shows the condition assessment and climatic conditions estimation using the Mahani method based on the statistics of the Semnan synoptic station's meteorological station. As you can see from the table, the air is hot every day in the 5 months of the year and 3 months in optimal terms and in 4 months. The air condition is appropriate for 6 months from the cold and one month from the warmer and for 5 months. Therefore, the need to cool the air only in one month from the year is required, in absolute terms, a month from the day of the day (**Table 5**).

(Warm) if the average temperature is high.

(Suitable) if the average temperature is between the limits of ambient temperature.

(Cold) if the average temperature is at its limit.

Taking into account the thermal indices of the table and humidity group, rainfall and average monthly temperature, and comparing itare obtained with the Mahani Index table, the number of months of these indices.

Therefore, the indexes, the thermal status of the Mahani table are as follows (**Tables 6-8**).

8. In Order to Optimize the Establishment of the Building in Semnan City

Today, the importance and necessity of paying attention to climatic condition has been proven in the design and construction of buildings [16]. One of the main features of sustainable urban environments is their compatibility and their coherence with local climate characteristics [17]. Therefore, recognizing, understanding and controlling the climatic effects of urban areas is a major prerequisite for the planning and design of urban spheres, which requires prioritizing the program's special attention prior to the operation of the projects and projects Designers and Planners [18].

In order to properly select the effective factors for the establishment, we will review the methods of thermal exchange of the body and the surrounding area: Thermal exchange of the body and the surrounding environment are done in different ways.

Table 5. Mahani table of Semnan city.

Climatic parameters	January	February	March	April	May	June	July	August	September	October	November	December
Average monthly maximum	8.1	10.9	17.1	23.3	29.8	35.4	37.7	37.8	32.4	25.7	18	11
Average monthly minimum	-1.3	0.5	5.8	10.6	16.6	21.7	24.3	24	18.6	19.7	6.3	0.8
Average monthly fluctuations	9.4	10.4	11.3	12.7	13.2	13.7	13.4	12.8	12.8	12	12	10.2
Average monthly maximum (morning)	52	62	71	71	67	57	54	46	29	37.5	29	40
Average monthly minimum (afternoon)	29	37	46	52	43.5	26	31	25.5	40	19	19	41
Average	40.5	49.5	58.5	61.5	55.25	45.5	42.5	45.75	49.5	28.45	29	30.5
Moisture group	2	2	3	3	3	4	4	4	1	1	1	2
Rainfall	9.5	10.5	18.7	24.1	20.8	21.6	13.7	16.5	3.6	1.2	1.2	1.7
The upper limit of comfort per day	28	28	30	30	30	42	42	42	40	30	30	28
Low comfort per day	21	21	22	22	22	23	23	23	22	22	22	21
High comfort at night	14	14	14	14	14	14	14	14	14	14	14	14
Low comfort at night	14	14	14	14	14	14	14	14	14	14	14	14
Heat condition per day	Suitable	Cold	Cold	Cold	Cold	Cold	Suitable	Suitable	Warm	Warm	Warm	Warm
The thermal condition at night	Suitable	Cold	Cold	Cold	Cold	Cold	Cold	Suitable	Suitable	Warm	Suitable	Suitable

Source: author, 2016.

Table 6. The concept of Mahani table indices.

Concept of indicators	Heat status day night	Rain	Moisture group	Monthly air fluctuations
Ht: Air flow is essential.	Warm		2	
	Warm		2 & 3	Less than 10
Ht: The flow of air is favorable.	Suitable		4	
Ht: Rain protection		More than 200 mm		
At: Heat capacity is essential.			1 & 2 & 3	More than 10
At: Free space is essential for sleep.	Warm		1 & 2	
	Warm suitable		1 & 2	More than 10
At: Protection against the cold.	Cold suitable			

Source: author, 2016.

Table 7. The concept of Mahani table indicators.

Month	April	May	June	July	August	September	October	November	December	January	February	March
Index	A1	A1	A2	A2	A2	A2	A2	A3	A3	A3	A3	A3

Source: author, 2016.

Table 8. Concept of moisture group.

1 st moisture group	If the relative humidity is less than 30%
2 nd moisture group	If the relative humidity is less than 30% - 50%
3 rd moisture group	If the relative humidity is less than 50% to 70%
4 th moisture group	Relative humidity is more than 70%.

Source: author, 2016.

- Movement
- Radiation
- Evaporation
- Guidance

It is natural that in this case, the heat exchange is not carried out equally. The displacement of 40% of evaporation to 20% of radiation is 40% and guidance is done very low in direct contact. In the heat exchanger, due to the low relative humidity of the fans, there is no possibility of heat exchange through evaporation, and hence the shape of the heat exchangers will not function as well. Only in this climatic region (Semnan), due to the low relative humidity of the humus, the heat exchange radiation pattern could be used correctly. In this way, the effect of the amount of radiation energy on the building and on the outside of the building is reduced to a minimum.

Optimum Deployment Area

With the above mentioned methods, we can choose the angle of 25 degrees south-east as the optimal direction. In this regard, the undesirable effects of effective factors have been minimized. It is normal to choose an optimal range in terms of land complications and administrative constraints. The separation between the north and north of 40 degrees south east has been chosen as the first order of the settlement, which is preferred in this area to the nearest 25° south-east.

Between 45° and 40° south-east and -0.5° southwest are selected as the direction of both installations of the building. The range is acceptable for the degree of distraction.

9. Housing Adaptation to the Climate

Bioclimatic Building (Givoni)

In addition to free space conditions, providing comfort in the thermal conditions of the interior spaces depends on the thermal properties of the structural components of the building, and these conditions depend entirely on the climatic conditions governing the environment around the building. Therefore, building different components and elements is needed to meet the thermal needs of the interior spaces. One of the methods of biomedical evaluation, which has the proper efficiency for designing and determining the ecological status of buildings, is a biologic building architecture. The human comfort zone has been iden-

tified in relation to the two climatic elements of relative humidity and temperature. In the lower range of the comfort of obtaining internal heat and the active and passive solar system and in the range above the comfort zone with a natural and comfortable ventilation, comfort conditions are created in the interior [19].

After transferring the information on the climatic diagram of the Givoni to the comfort status, this is as follows:

- Condition of the air in September and May Day, May, June and July in the evening in comfort zone.
- Thermal condition of the moon during the day with natural ventilation allows for the creation of an appropriate interior space.
- June and daily in July and August using heavy materials are suitable indoors
- The thermal conditions in July are provided with the use of a water cooler in the interior space of the appropriate environment building.
- May and September, the months of November and March during day and night conditions is created with internal heat gain sufficient space.
- The heating conditions of the month of October and May during the night and December, January and February are suitable with the inactive solar thermal system of the building's interior space.
- The nightly heating conditions of the March and November months are possible with comfort from the active sun.
- Thermal conditions at night the months of December, January and February using conventional heating system that provides easy conditions.

10. Climate and Architectural Components

10.1. Semnan's Native Architecture Features Include

1) Structural Space: The main index of Semnan's native architecture is its introspection. This type of architecture has a central courtyard and the rooms are usually located on its four sides, and in order to ventilate the interior, they are built in a corner of the building. The yard's form is usually a garden pit (in some cases flat).

2) Effect of Airflow and Sunlight: In a warm and dry climate such as Semnan, which has high heat in the summer and severe cold in the winter, it is necessary to adapt to nature and environmental conditions, for example in the form of a climate The plan is compact so that the levels are less exposed to sunlight. As explained above, due to intense sunlight exposure in the summer and high winter temperatures, to place the building from south to south-east to receive the highest amount of energy in winter. Also, in order to use the proper winds, the architects used the windbreaks to convey the airflow into the rooms and send out hot and contaminated air. With regard to the above, the housing architecture in Semnan has been designed to use renewable energy such as air and sunlight to be perfectly appropriate and optimal, which reduces the use of fossil fuels and thereby enhances environmental sustainability.

3) Construction Materials: Construction materials in any weather conditions

act in a way that, in warm and dry weather, the type of materials used has great effect on the comfort of residents in the building. In this climate, building materials must be selected in such a way that they are resistant to heat and have high thermal capacity. Among the materials used by the builders are the flowers and derivatives thereof, and if the stone or wood is used in the buildings, it is mixed with soil and mud, because this type of material is compatible with the dry climate of Semnan has it. Another important point is the construction of the building, the thickness of the materials, the thickness of the walls should be such that it can resist long exposure to sunlight, as well as the color of the materials used in the building should be clear so that the amount It reflects a lot of sunlight, the bright color of the soil is the best color of the selected materials in the warm and dry area.

10.2. New Semnan Architecture Features

Along with such an informed architecture unfortunately, we are witnessing the emergence of a new architecture that is completely inconsistent with the climatic conditions of the region. Houses have been made of row of concrete, steel and bricks. With courtyards are not suitable due to short on the walls, on the one hand to be able to create shadows and cannot stand in front of the wind strong wind and bright sun, and a disadvantage to those who create, on the other hand the use of walls and ceilings thin that the situation in the region, any resistance, and the use of pitch black on the roofs because of the dark color of the increased temperature in summer and to heat transfer through the roof reduces in winter the temperature inside the house and finally the use of heating appliances with fossil energy consumption and cooling devices due to improper temperature indoors are used in different seasons.

Based on the climatic zoning of the city, Semnan is in the relatively cool climate group 17. In terms of winter conditions, it is necessary to use thermal equipment to keep internal spaces warm at night. In the summer, the air is warmed so much that its thermal conditions are in the range of water cooler. In non-critical conditions, the warmest month is the thermal conditions in the range of heavy building materials.

The share of heat demand of the building and the main objectives of the building design in the relatively cold climates of the heating share, using a mechanical system is 15% - 25%, solar energy is 20% - 25%, in the comfort range, is only 15% - 20%. The share of natural cooling with heavy building materials is 15% - 105% and mechanical cooling using an air cooler is 5% - 15%.

The main goals of the climatologically design of Semnan city

- Protects the building against sunlight
- Using solar energy to heat the building
- Reduced building heat dissipation
- Determination of the daily fluctuation of air temperature
- Reducing the effect of wind on building heat dissipation

Building protection against outside hot air

- Increase air humidity
- Reducing the effect of dusty winds on buildings

Building as a peculiar place in different forms has a direct relation to climatic conditions. This is a peculiar form of architecture that each of these components directly and indirectly affects the climatic conditions in the field. The effect of the undesirable effects of climatic conditions is reduced on buildings, henceforth some of the features and functions of architecture are considered.

A disassembled object, the building and its open space, is created. Here we look at the spatial spaces:

1) Yard

The courtyard has a great influence on the open space of a building in a state of tranquility and security. In the open spaces of the yard, it is necessary to increase the shadow level in the warm and dry climates of the area. It is possible to do this by carving. The close proximity of the warm climate system makes it possible for the neighboring courtyard to create a shadow over the level of the yard (the courtyard's horizontal surface acts as the strongest absorbent of the sun's sunshine). The yard, which is parallel to the foundation of the building, they can be used in other countries. This will cause the sides to rise in order to maintain the level of shadowing before dawn.

2) Canopies

The need for hot surfaces and solar panels are among the most important factors in design. The various luminaries in the building are considered as an important part of the building due to the creation of a large number of buildings. Two-story canopies can be made of horizontal and vertical canopies.

- Horizontal canopies

The need for hot surfaces and solar panels are among the most important factors in design. The various luminaries in the building are considered as an important part of the building due to the creation of a large number of buildings. Two-story canopies can be made of horizontal and vertical canopies.

- Vertical canopies

These canopies will be created in order to create a preview on the window at any time before and after. These hours of daylight saving up on solar energy junctions have the highest energy. The importance of these canopies, is due to the fact that they prevent the most intense radiation from the vertical plane and its impact on the inside, can be more sensitive to horizontal weather

11. Conclusions

The traditional architecture of Semnan is introverted. In general, it should be stated that the new architecture not considered which is inconsistent with the climate, makes the inhabitants uncomfortable and, on the other hand, improves the use of materials and increases the fossil energy consumption of the sustainability architecture that has existed in the past.

In different climate surveys, we have summarized the following:

- Establishment for 25 degrees south and east of the optimal first degree.
 - Creating a densely populated city.
 - Compact and compact construction of the building and minimization of external surfaces.
 - Choosing the square plan of buildings.
- Efforts to reduce the adverse impacts of climate:
- Use of heavy materials with high thermal capacity.
 - Creating a building block and a building floor and streets.
 - Avoiding intense wind damage in the area to reduce the moisture content of the trees.
 - Creating small windows and reducing their surface and their number.
 - The use of suitable hinges for the windows of the hub will reduce the unpredictable impact of solar energy into the building.
 - Creating an appropriate space between trees and buildings to create a heat exchanger, which reflects the energy stored in the open air.
 - The use of interior spaces with high ceilings.
- Mahan suggestions
- It is better to build structures on the east-west axis, and to be placed in the sun at lower temperatures in the north and south.
 - In connection with the air flow, the rooms should be designed in such a way that they are contacted by free air. That is, the forecast of the temporary flow of airbags in this city is a requirement.
 - External walls, internal walls should be considered as heavy loads and impacting materials (more than 8 hours).
 - Bounce widths range from 25 to 40 percent.
 - Predicting spaces for sleeping outside the building (open spaces) is recommended in this city.

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