

Vernacular housing in Teziutlán, Puebla

Vivienda vernácula en Teziutlán, Puebla

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Abstract

This research aims to identify the characteristics of Teziutlán's vernacular architecture, for its dissemination awakening interest in this architecture in the process of disappearing. The methodology used in this research is qualitative, the review and analysis of documentary sources, visits to Teziutlán and interviews with locals and information of daily life in relation to space were carried out. As for the limitation of the research work is that being very large Teziutlán could not visit the whole place, through which the information was concentrated in the municipal head and the auxiliary board of San Juan de Acateno. The contribution that this work is that allows to identify the characteristics of vernacular housing and proposes an architectural proposal that arose in a master's degree from the Faculty of Architecture of BUAP. This work consists of three sections: The first is the so called "Geographical Location" where the location and characteristics of the place are identified; the second part is called "The Concept" where the meaning of vernacular architecture and its characteristics is defined and the third part "Alternative Project" where the work done by the architect Anabel Garate Hernández is exhibited.

Place, Features, Adaptation

Resumen

Esta investigación tiene como objetivo identificar las características de la arquitectura vernácula de Teziutlán, para su difusión despertando el interés en esta arquitectura en proceso de desaparición. La metodología utilizada en esta investigación es cualitativa, se realizó la revisión y análisis de fuentes documentales, visitas a Teziutlán y entrevistas con habitantes del lugar e información de la vida cotidiana en relación al espacio. En cuanto a la limitación que tiene el trabajo de investigación es que al ser muy grande Teziutlán no se pudo visitar todo el lugar, por lo cual se concentró la información en la cabecera municipal y la junta auxiliar de San Juan de Acateno. La contribución que este trabajo es que permite identificar las características de la vivienda vernácula y plantea una propuesta arquitectónica que surgió en una maestría de la Facultad de arquitectura de la BUAP. Este trabajo se compone de tres secciones: La primera es la denominada "Localización geográfica" donde se identifica la ubicación y características del lugar; la segunda parte se llama "El concepto" donde se define el significado de arquitectura vernácula y sus características y la tercera parte "Proyecto alternativo" donde se expone el trabajo realizado por la arquitecta Anabel Garate Hernández.

Lugar, Características, Adecuación

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Introduction

When man passed the stage of food collection, he was involved in new needs such as building the first architectural models of housing generating the concept of population and later of city. Among his first ephemeral constructions he had to use materials that he had in his path such as branches, leaves, skins and bones of animals. However, when established it requires more resistant constructions and at first it copies the forms of nature and later the orthogonal space composed of two straight lines perpendicular to 90 degrees. This was a key moment because from there came the development of architectural models and the first prefabricated materials, supported by the concept of community where everyone worked for the common good. The use of the curve and the line became part of the design of spaces and together with the materials product of nature produced what is now known as vernacular architecture.

Location Geography

The Sierra Norte de Puebla is an extensive area of the final part of the Sierra Madre Oriental that covers approximately 100 kilometers long and 50 kilometers wide; it is made up of 65 municipalities, with an approximate area of 5000 km². It is divided into the coffee zone, the lower zone, the southern slope or southern slope and the Bocasierra area where Teziutlán is located.

The municipality of Teziutlán is located in its largest territory in the Sierra norte de Puebla and a part in the Sierra Madre Oriental, has 92.6 km² whose limits are: to the north with the municipality of Hueytamalco, to the west with that of Chignautla and Hueyapan, to the southwest with that of Chignautla, to the southeast with that of Xiutetelco and to the east with that of Jalacingo of the state of Veracruz. It is a place that is located in a rugged, mountainous place with large or small plateaus staggered towards the coast, of the Gulf of Mexico. Teziutlán has large, wooded areas with trees such as: ocote, oak, red pine, liquidámbar and soap and fruit trees such as pear, avocado and peach. In this municipality is preserved the ecological reserve of El Colihui one of the last fog forests of Mexico and the world.

The climate of the Municipality of Teziutlán is humid and cold in the winter, temperate and rainy in the summer and autumn, subject to sudden changes in temperature and pressure due to the frequent atmospheric disturbances of the Gulf, due to its proximity. The prevailing winds, during the day, are from the North, and at night, from the South. In the spring, strong winds usually run from the South. In the winter, frost and water-snow. (INAFED, 2021).

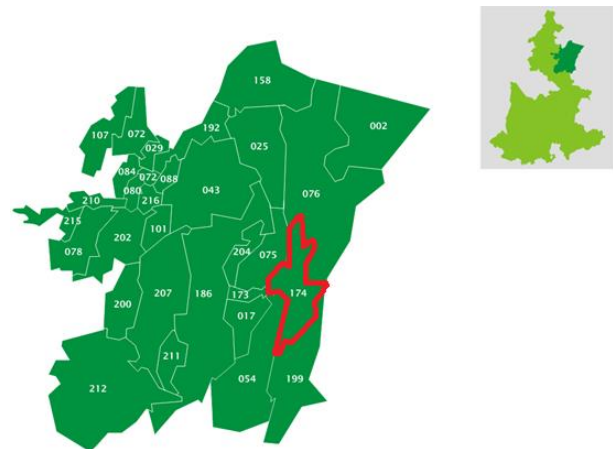


Figure 1 Map of Region II of Teziutlán, state of Puebla. Description: 002 Acateno; 017 Atempan, 025 Ayototxco de Guerre; 0.29 Caxhuacan; 043 Cuetzalan del Progreso; 054 Chignautla; 072 Huehuetla; 075 Hueyapan; 076 Hueytamalco; 078 Huitzilán of Serdan; 080 Atlequizayan; 084 Ixtepec; 088 Jonotla; 101 Nauzontla; 107 Olintla; 158 Tenampulco; 173 Teteles de Ávila Castillo; 174 Teziutlán; 186 Tlatlauquitepec; 192 Tuzamapande Galeana; 199 Xiutelco; 200 Xochiapulco; 201 Xochitlán by Vicente Suárez; 204 Yaonáhuac; 207 Zacapoaxtla; 210 Zapotitlán de Méndez; 211 Zaragoza; 212 Zautla; 215 Zongozotla and 216 Zoquiapan
Source: INAFED, 2021

The Municipality identifies three climates: humid temperate climate with rains in summer in a small area of the extreme South of the Municipality; Humid Semi-warm climate in the north of Teziutlán, with abundant rains all year round. In the center of the municipality where the city is located is characterized by humid climate with a humidity index between 75 and 80% during most of the year, it is a cold area with an average annual temperature is 12.6 °C and enveloped by large blankets of mist and light rain. Teziutlán is considered the foggiest region in the country, with 280 days a year. (INAFED, 2021)

It is for this reason that the house in Teziutlán usually has porticoes to allow the inhabitants to carry out some outdoor activities of two pillars up to 8 pillars, depending on the length of the houses. Also, the housing and enclosed spaces for cellars occupy 30% of the land, the porticos have 5% and 65% is free area. Because of the climate, social life takes place inside the house and in the porticoes and when the weather permits it occurs in the church, the pantheons, the municipal presidency, in the sports fields and in the rivers where women wash clothes and the family transfers water to their homes; however, this activity has decreased due to the provision of drinking water.



Figure 2 1) Location of the area where the project is located in the auxiliary board of San Juan Acateno belonging to the municipality of Teziutlán, Puebla. 2) Faculty of Agrohydraulic Engineering, Buap.3) University Street. 4) 12 December street

The concept

Currently there are multiple definitions according to the areas of knowledge, but the most accepted is to define it as native architecture product of the community; where everyone participates in its construction so the inhabitant is his own builder; although he does not have the profession of mason..."Vernacular: It refers to that type of architecture that has been designed by the inhabitants of a region or historical period determined by empirical knowledge, the experience of previous generations and experimentation". (Carranza, 2010, p. 22).

Tradition is an important part of vernacular architecture as the use of local materials in construction was transmitted and is now transmitted orally and intergenerationally; whose techniques are taught to the new generations when they participate in the erection of new homes. This process was given by trial and error until the communities generated a type of construction that was efficient and that could only be learned in a practical way when working on site. (Carranza, 2010, p. 17)

When building large works, the native house was seen as a functional architecture and as a simple link in the architectural evolution. However, until the second half of the eighteenth century some architects and builders began to look at this traditional architecture and to express interest in construction techniques. This was due to a moment of crisis, as it required new styles with nationalist tendencies produced by information written to the masses, specifically by illustration. In addition, the rise of the Industrial Revolution caused the emergence of new materials of industrial origin and that in some social sectors of conservative court saw as a danger of dehumanization of architecture." (Warrior Baca, 2010)

To these elements, functional concepts and identity are annexed because all forms of vernacular architecture are the result of the needs of individuals probe values, behaviors, the way of life and climatological conditions are introduced that are intertwined to form an architectural trend, without theoretical or aesthetic pretensions. The climate is the guiding element of this type of architecture because it allows thermal insulation in cold areas, using materials of high thermal mass with few windows or none to create an airtight space and thus conserve heat. In warm areas to cool the buildings requires light enclosures, with lattices or the use of techniques for natural ventilation. The location and orientation of the houses go according to the orientation of the wind and the sun, because in regions with very strong winds or places of high precipitation are located in such a way as not to be dragged by the wind or are flooded by the rain.

However, the location of the housing sites may correspond to other factors such as culture, environmental materials, environmental characteristics or productive activities in the region. The latter may modify the concept of the program of needs of the inhabitants of the house, since it is also used for the production of handicrafts, crafts or wineries. In the case of the economic position of the families, it will affect the possibilities of making significant improvements in the house where the application of resources to strengthen the structure, maintenance, add new materials, expand the spaces of the house, add new spaces or replace the vernacular housing that represents the economic level of the inhabitants of the house predominates. This is a factor that causes the deterioration or disappearance of vernacular architecture because natural materials are replaced by processed materials that represent the development and consequently the deterioration of the environment. (RODRIGUEZ, 2021).

As in many countries where vernacular architecture still exists, in Puebla rural areas are the ones that maintain a large number of vernacular dwellings, while in urban areas they have disappeared impressively since the 1970s due to the introduction of materials such as concrete. Although there are architectural trends that seek to rescue vernacular architecture by considering it sustainable, it is a difficult struggle against the concepts of modernity or progress. Another factor that has displaced vernacular architecture is the social breakdown of communities, either by population growth or by the migration of their inhabitants to places that allow them better living conditions. However, the inhabitants of traditional communities have a strong sense of community and familiarity that cross borders, that is, people working abroad send resources to their communities for the improvement of their homes or for the agricultural production of their land. This occurs because there is a strong cultural identity that exists as a consequence of individual and collective memory, of symbolic elements, customs and traditions.

Architecture is a part of the identity expression of a place, it is recognized as an important manifestation of culture where the traditional experience of formal design of the is based on physical characteristics of the environment, in its materials, construction systems, and spatial configuration produced by historical phenomena and symbolic references of the site. Although the symbolic elements have been lost, even the communities recognize some symbols in the constructions such as fertility, fecundity, male virility and magical powers. In addition, rural architecture is between the environment and its products with social practices where housing prevails organized in three areas: for service, rest and social relations. Therefore, there are architects who in recent years have tried to identify and rescue vernacular values through their insertion in contemporary architecture, aligned to the concept of sustainability. (GARCIA, PAREDES, MORENO, & PEAK, 2021)

The characteristics of the house

The houses were built with bioclimatic criteria to contain the heat within them and allow the oxygenation of the space without receiving the constant rain, for which they were forced to use materials from the region in such a way that the result as a whole is homogeneous. In the vernacular house predominates the massif over the vacuum, since there are houses that lack windows or with few windows, usually rectangular.

As for the houses, in the historic center or haciendas are 2 levels; in the mountainous area wood is used and in the highlands between mountains adobe is used and in the stone area stone is used and on a smaller scale adobe. It is common to observe one-bedroom homes with toilets, sometimes semi-detached, although it predominates to move this type of services away from the house. On the other hand, by using materials from the region, a harmonious set is achieved that has been reproduced by artists and that characterizes Teziutlán.

In the city you can see the houses that are in front of the street or around patios, to ventilate with small windows, although there are cases that lack them and distribute spaces such as cellars, corrals, orchards and living areas.

On the other hand, the configuration of the space is based on the topography and environment, made up of pastures, shrubs, banana palms, orange trees, tangerine, guava, peach and coffee plantations. The interior space contains 1 or 2 beds made up of wooden platforms, a table for the altar, a table to eat with chairs or benches that they place around the interior space, space for settling clothes, coat racks, sometimes they have sewing machines and space for cooking. In the space of attached kitchen or near the house and there can be 3 types of kitchen: the first is the "tlecuil", floor stove made by rocks in a circular shape that serves as a base to place on pots or comales; in the center the firewood is placed and the person sits on a small bench where he rests to carry out his activity. The second is a stove made with wood at the height that allows the person to stand and a bed of earth with large stones that serve to support the pots and comales. The third is the wood-saving stove or Patsari stoves "the one that cares or the one that protects", disseminated by the federal government program of construction of Ecological Decent Housing for rural areas. There are different types but the most common is the one that consists of a base of partition or stone, wooden frame or sheet that serves as a shoring where the burners are placed. Then it is filled with a mortar leaving the fuel gap free.

For the sanitary services the "temazcal" is used, although not all the houses have it, in this space the function of assigning healing properties close to the house with minimum dimensions of 3.3x1.8m is a space with walls are made of stone with an entrance of 0.5m wide by 0.95m high and platforms. The latrine is built with different materials and once it is filled it is built elsewhere because it lacks a septic tank with approximate dimensions of 2x2 m away from the kitchen.

Each built space has areas of vegetation and in the front a space with grass and vegetation is left, although there are cases that in front is placed a patio with stone or concrete firm that is used to dry seeds, as part of the family business or for different activities. There are no pens and they are only built when they are large animals.



Figure 3 Vernacular housing of adobe
Source: (GARATE, 2016)



Figure 4 Living place in Teziutlán, Puebla
Source: (GARATE, 2016)

It is common that natural materials do not have coatings, but when it exists lime with red and ochre colors or without dye is used directly on the adobe and stone. Although in some areas lime mortar coatings are used. The artisanal construction system used for the construction of the houses consists of stone foundations with overgrowth, stone walls, adobe and wood, ceilings with wooden beams and tile with slopes of one and two waters so that the rainwater is displaced and to protect from the heat and that the roofs are not over hot, with eaves to protect the perimeter of the construction. When the covers are flat, lids are used leaving a considerable height for the air to flow and contain the interior temperature.



Figure 5 Vernacular housing of stone walls, adobe and ceilings of wooden beams and tile
Source: (GARATE, 2016)

According to the 2010 population census (INEGI, 2010) housing conditions are as follows:

Type of housing level 1. It represents 40% of the total of houses with an area of less than 40 m², housing of 1 level, with stone or wood walls such as boards, sticks and morillos; tile beams or cardboard sheets and earth floors.

Type of housing level 2. It represents 51% of the total of houses with an area from 40 m² to 100 m², of a level with stone or adobe walls with or without coating; reinforced concrete tile or slab beams and concrete floors with or without ceramics.

Type of housing level 3. It represents 9% of the total of houses with an area of more than 100 m², predominate from one to two levels, but you can find constructions of more levels; with walls of partition, block and cement stone with or without coating; concrete slabs or shingles and concrete floors with or without ceramics.

In recent decades there has been a gradual change of the urban image in Teziutlán due to population growth, economic development and especially the income of remittances that are aimed at creating new constructions that have little or nothing to do with traditional architecture. On the other hand, the deterioration of vernacular dwellings was already evident in the 2010 population census (INEGI, 2010) as the following information was found: 9% of the dwellings are in acceptable conditions, 54% in regular conditions and 37% in precarious and visibly marginal conditions.

Another aspect that causes this deterioration of the urban image is the so-called phenomenon of the "architecture of remittances", which is a process of change which has 3 aspects. The first is to use resources for the maintenance of vernacular architecture, the second is to replace the roofs with another type that requires less maintenance or "strengthen" the construction with castles and / or chains of reinforced concrete, and finally to build with prefabricated materials and in some cases with architectural styles that migrants observe in the regions where they have to migrate; either inside or outside the country.

However, in the northern Sierra these buildings still exist and show well-preserved sites, according to the climate and the environment. This architecture is the testimony of the presence of the indigenous peoples who inhabit this land as Otomi, Totonacas, Tepehuas, Nahuas and Huastecos, its conservation allows its identification before their community and outside it.

The Sierra Norte de Puebla from the pre-Hispanic period until the nineteenth century, was part of the Totonac region, Totonacapan. However, because of the strength, of the Totonac population, who dominated a very large region, the Mexican government divided that territory into two states; the state of Puebla and Veracruz.

This area is vulnerable due to the earthquakes and the constant rain, as well as the changes of temperature that produces contractions and crumbling in the building materials.

The vernacular constructions in Mexico have been considered as evidence of the poverty and lack of economic, material and technological resources of the country. Therefore, the institutions have encouraged the use of modern materials as a symbol of progress.

However, due to the deterioration and destruction of the cultural heritage caused by the earthquakes, it has caused the Universities to disseminate the artisanal construction processes; therefore, research and cooperation projects on the phenomenon of seismic vulnerability.

This has been encouraged in places like the state of Puebla where the 2017 earthquakes caused the irreplaceable loss of its cultural heritage. This led to investigations being directed towards seismic vulnerability in relation to the consequences of humidity. As well as the rescue of the constructive tradition and the study of the local materials that allow its replacement at low cost. (NIÑO, RESTREPO, & SOLARTE, 2021).

The vernacular houses are perceived as unsafe because they are not very resistant, despite the fact that the 2017 earthquakes showed that this is not totally true because the damaged buildings in the state of Puebla were colonial buildings and the vernacular constructions had little impact.

However, there is a perception in users that they prefer to start a reconstruction with new materials offered by the institutions to repair the damage suffered by the earthquakes, causing that there is no compatibility between the materials and between the construction processes. The concepts of culture and seismic vulnerability allow to assess the determined risk of the house being susceptible to damage, that is why there are still communities that repair their homes with materials from the region because they recognize this activity as something traditional and natural of their community. (NIÑO, RESTREPO, & SOLARTE, 2021).

On the other hand, the use of materials such as concrete, steel or the manufacture of blocks impact the environment, whose conditions will affect future generations. This is encouraged by the thought that the damage to the environment is very long-term and that others will be able to restore the conditions to their origin and that natural resources are unlimited- As well as to the techno centrist consciousness where the need for progress prevails, seen as the implementation of materials and constructive systems of the industrialized countries. That is why research has been directed towards sustainable technologies such as ecological hydro-sanitary systems, rainwater harvesting and the rescue of artisanal construction materials. (BORJA & ANGUMBA, 2021).

Alternative project

There are projects that aim to rescue the constructive tradition, giving it an architectural distribution according to the new needs of today, such is the case of the project for rural housing in Acateno, Teziutlán of the architect Anabel Garate.

In his project he establishes some considerations: The relationship with the environment and the integration of housing into the natural environment; the social and cultural relationship of the communities manifested in the social spaces and conservation of the typology and configuration of the house. The urban structure is a system of broken plate in relation to the topography with irregular lots with an approximate area of 450 m² whose longest width is located towards the street, surrounded by vegetation.

"The location of the house within the lot, responds in most cases to the pre-Hispanic conformation characterized by dispersed housing unlike the Hispanic, where the parameters of the houses are united, forming a compact city. Thus we find that the houses are mold at the foot of the valley protected among the vegetation, submitting to the general image of the landscape". (GARATE, 2016, p. 48)

Among the needs that the project had to respond to are the lack of private areas, lack of a space for food storage, lack of the delimitation of a spatial area for the cultivation and storage of domestic animals, lack of maintenance and conservation of homes and the use in some cases of materials that do not completely isolate their inhabitants from external environmental effects and harmful insects.



Figure 6 San Juan Acateno, Teziutlán-Puebla

As for the construction systems, it is intended to strengthen the use of materials from the region to reduce costs and to use the values of bioclimatic architecture, in accordance with the physical environment and agricultural work of the region. Due to the conformation of the terrain and the plateaus between the hills and mountains allows to have interesting views that go in relation to the natural environment.

For the elaboration process it is important to choose the area where the house will be located favoring the circulation of north-south air and the bedrooms to the east and west. One of the problems is to remove the roots of plants, shrubs and trees especially if the wooded area is found. The foundation must be of stone that abounds in the region where the following dimensions are used: base of 90 cm. crown of 30 cm. and variable depth because the ground can present large depressions and it is necessary to place retaining walls and for danger of landslides deep foundations are used. There are foundations at the base of the walls when they are adobe; Also, you can use stone walls of 30cms. For the enclosures in windows and doors will be used wooden beams taking care that they have at least 40 cm. of embedding in the wall, in addition it is recommended that the joints of the masonry, so that they do not house insects, dust and maintain a clean environment.

In this area it is frequent the use of wood with beams and wooden planks with overlapping joints to seal the interior, in this case it is not necessary to place stone masonry foundation and you can anchor the wood in the ground, however, the humidity deteriorates it quickly so it is recommended to place foundations or a reinforced concrete slab. Bahareque is also used with branches or reed placed vertically interwoven with mud coating and short fibers such as straw or dried grass, filling the spaces that remain between the branches or reeds. It is recommended that before burying the branches, diesel or some material that can protect the branches or reeds be placed.

In the case of the floors will be used floors of rammed earth, stone, brick or firm polished concrete with or without dye of 5 to 6 cm. thick ... "Due to the type of climate that presents all the northern Sierra of the State of Puebla, it will be necessary to place a layer of gravel stone of 10 cm thick on the surface accommodating it uniformly (due to the high percentage of rain that this area presents during the year) and then a layer of pomex stone 10 cm thick will be placed to add thermal insulation". (GARATE, 2016, p. 48)

The ceilings can be made of wooden beams and resinous wood cover, sheet or tile, which must be well attached to the beams with a minimum slope of 30% and take care that the summit is well protected at the junction by means of joints to half wood joined and reinforced by means of screws or bolts. If wood is used, it is necessary to apply a flaxseed, wax or diesel. The project has a yard, an animal unit formed by corrals, separated from the house at a distance of 8mts delimited by vegetation, orchard or family vegetable will be delimited by a wooden fence or sticks to prevent the passage of animals, area of trees.

GARATE (2016) proposes for the spatial configuration of rural housing in 4 areas: coexistence area, rest area, service area and green area. The living area is composed of living room, dining room, altar and green areas proposed to the outside of the house; the rest area or bedrooms; the service area consists of patio, kitchen, toilets, area for washing and laying; and the area of green areas and corrals as presented below.

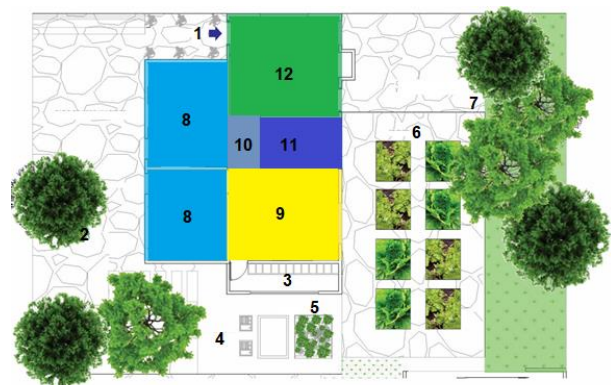


Figure 7 Zoning by areas of the rural housing improvement model in the Municipality of Teziutlán, Puebla. 1 entry; 2 multipurpose yard; 3 winery; 4 services; 5 biofilter; 6 vegetables; 7 tree cultivation breaks winds and fruit trees; 8 rest area, 9 kitchen; 10 lobby; 11 health services area and 12 coexistence area

The housing project contemplates the collection of rainwater. In addition, it uses the treatment of soapy waters by means of a biofilter will be stored for irrigation of the vegetable.

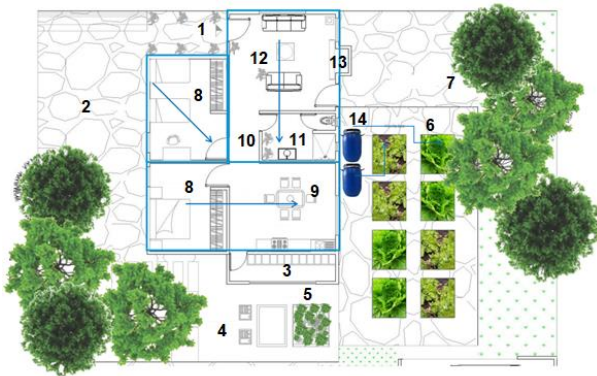


Figure 8 1 entrance; 2 multipurpose yard; 3 winery; 4 services; 5 biofilter; 6 vegetable; 7 tree cultivation breaks winds and fruit trees; 8 bedroom, 9 kitchen; 10 lobby; 11 bathroom and 12 family room; 13 altar; 14 manure of organic waste for the creation of compost to be used for the restitution of agricultural land

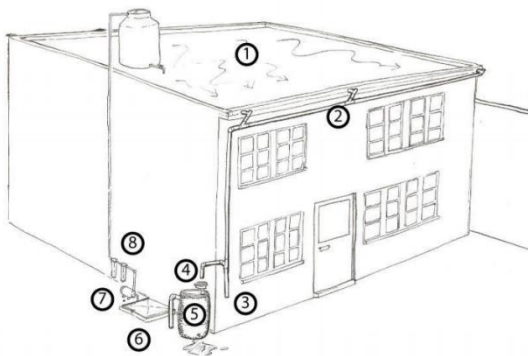


Figure 9 Diagram of the components to be used for rainwater collection

1) The Roof. 2) Downs and / or gutters. They can be made of PVC or stainless steel, it is important to keep them clean. 3) Leaf filter is a mesh that prevents leaves and other basurites from entering the cistern. 4) Interceptor of first rains separates the dirtiest part of each downpour so that it does not enter the cistern; it must be drained at least every three days. 5) tank. 6) Cistern and chlorination.

Conclusions

Thanks to the favorable geographical location and its natural riches of the municipality of Teziutlán, it favored the development of vernacular housing.

The vernacular house was designed by the inhabitants of this region using the characteristics of the materials of the area, the location of the construction, orientation with respect to the sun and protection from the rain. On the other hand the construction system is also very much in line with the location allowing a high quality workmanship and excellent execution therefore the project allowed that, perfect relationship in the execution of the project because it is totally sustainable if it affects the environment of the area. The proposal is of great importance because in its entirety it respects the characteristics of vernacular architecture, which today is one of the most interesting works within architecture, to continue preserving this type of vernacular architecture, in our times, because it marks in some regions, such as the studio, to remain a landmark of the region.

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