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The *pajarete* Construction System in Traditional Housing in the State of Colima, Mexico

Ir a versión en español

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ABSTRACT

Bahareque, a type of wattle and daub, is one of the construction techniques with earth that has received little study and analysis. However, in some regions it was the method most often used for the construction of houses, due to the existence of materials of natural origin in the immediate surroundings, and its proven survival and potential for application in sustainable construction. The present text analyzes the use of this construction system in the Mexican state of Colima, where it is still used in various rural houses in which it has shown its thermal qualities and resistance to earthquakes.

KEYWORDS

earthen architecture; conservation; built heritage; Bahareque; Mexico

INTRODUCTION

Earth has been present in the development of different civilizations around the world; together with the growth of humanity, various construction systems—increasingly sturdy and comfortable—have been created and improved. Throughout history, local resources have been used to find appropriate solutions to the primary need to provide shelter, by offering protection from climatic conditions, with the use of structures that are increasingly strong, robust and less likely to disappear both in the face of natural disasters and attacks by predators or enemies.

Over time, the earth used in architecture has demonstrated its capabilities by combining with other materials of natural origin,

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such as stone, wood, reeds, and lime, to develop suitable structural systems that have responded satisfactorily to various natural phenomena.

Nature provides a series of elements that man has learned to use in his evolutionary process for different purposes, where rocks, soils, trees, bushes, and grasses are the primary sources of constructive development. Gradually, the qualities of each element were discovered, and they were then shaped and combined through the materialization of local knowledge. Thus, better, more comfortable, and safer spaces appeared to provide functional accommodation. In the case of the earth, its properties were discovered and optimized, benefiting from being mixed with organic matter to provide greater resistance and flexibility for the erection of supporting structures.

In the territory that currently comprises the Mexican Republic, traditional building systems have historically been the result of cultural syncretism. The diversity of properties built over the centuries reflects the ability and skill of the builders in erecting living spaces. The use and optimization of natural building materials generated functional, habitable, and comfortable sites that housed people and activities for several generations. In the state of Colima, a significant number of constructions made of earth were established, using the techniques of adobe and bahareque. It is worth noting that, in the state of Colima, bahareque is regionally known as *pajarete*, with roofs made of tiles and palm. This type of building was common for several centuries because it was suitable for the climate and geographical conditions of the region; the thermal capacity of the earth was of great importance for the inhabitants of these places (Novelo, 2005).

METHODOLOGICAL DESIGN OF THE RESEARCH

From the bibliographic research on earthen architecture in the western region of the country, specifically in the state of Colima, it is evident that information on this subject is scarce. As a reference for the most significant national architecture, there is "Of Earth and Sticks" (*De tierra y varas*), which refers to the architecture of the region of the Sierra Gorda of Querétaro. Meanwhile, *Técnicas de construcción con tierra* (Garzón, 2011, p. 62) in Célia Neves and Obede Borges (2011) deals with various studies of the construction system in Central and South America. For this reason, this work considers as a preliminary survey the field research carried out through study visits in the different regions of Colima.

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Based on the various analyses, there is confirmation that in rural areas *pajarete* was used, while in urban areas, as indicated by Huerta, "most of the houses were built with adobe walls, wooden structures, and tile roofs; with large interior courtyards, shaded by fruit trees and ornamental plants [...]" (Huerta, 2000).

In order to identify the characteristics of *pajarete* houses in different regions, this research uses the conventional division of the state of Colima into three geographical areas: coast, valleys, and mountains. There were two purposes: to identify still existing case studies and to obtain the necessary information directly. Thus, this study collected oral information through interviews with the inhabitants of earthen dwellings, in addition to collecting more detailed graphic documentation and metric surveys, which became the focus of the research.

In order to identify the construction system of the buildings, eighteen homes were visited, and their builders or residents were interviewed. Subsequently, sixty-two technical datasheets were compiled with the information collected. The necessary data on the construction system in question were collected, using oral information obtained through interviews and the collection of metric and graphic units through surveys carried out in the field; this information was organized in datasheets. The process is as follows:

1. Interviews. Interviews had a non-structural-focused nature, there was no interview script, but there was a series of topics to be discussed which allowed a natural conversation to take place with the people interviewed, but following a script based on obtaining personal data on the builder or inhabitant, the construction system (foundations, vertical structure, enclosures, roof, finishes, carpentry, and current state of the construction), transmission of knowledge, and historical data on the building. Basic portable recording equipment compiled all conversations for later analysis.

2. Metric and graphical survey. A direct survey was done; this means that it was carried out with a small group of people (three) and using traditional measuring and documentation instruments. In turn, this process had three stages. First, there was a preliminary identification visit to understand the space and foresee the possible limitations for the development of the survey. Second, a freehand drawing of the building and the context was done, in which the metric data collected were subsequently placed. Third, the house was measured and a photo-

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graphic record taken for its digitalization, employing software in architectural plans (architectural plan, structural plan, front and side facades, longitudinal section, and cross-section per house).

3. Datasheets. There were two types of datasheets. The first, of an identifying nature, contains the data on the builder, the location, the period, and a description of each of the elements of the construction system; along with this datasheet, there are three others with all the graphic information generated: architectural plans and photographs. The second datasheet responds to the detailed description of the constructed parts of the house; it contains a general description, description of components, construction process, and materials used, which is accompanied by graphic representations and photographs.

EARTH-BASED CONSTRUCTION TRADITIONS IN THE HOUSING OF COLIMA AND THEIR TRANSFORMATION BY MODERNITY

The state of Colima is in the western part of Mexico, on the coast of the Pacific Ocean, at 103° 28' 58.5" west longitude and between 18° 41' 8" and 19° 31' 57" latitude; its territorial area is 5634.3 km^2; its maximum altitude is 3821 meters above sea level, and its minimum is 0, that is, at sea level (Figure 1). In the north, there is great geographical diversity that includes coasts and high mountains with extensive valley areas. Due to its latitude and proximity to the sea, a warm, humid climate predominates, with exuberant vegetation and the presence of bodies of water, such as rivers and lagoons (*Secretaría de Medio Ambiente y Recursos Naturales, Gobierno del Estado de Colima, Secretaría de Desarrollo Urbano y Universidad de Colima,* 2013).

These geographical conditions provided the region with soil combinations with cohesive and resistant qualities, which are optimal for construction. For this reason, according to various national and international authors, such as Gernot Minke (2001, pp. 13-22) and Guerrero Baca (2007, pp. 182-201), since ancient times raw earth and plant fibers have been used to create living spaces, with some adaptations. Today, although they are still used, it is to a lesser extent, unfortunately, as they are replaced by industrialized materials that, in addition to being highly polluting, do not offer comparable conditions of comfort.

In this context, there were an infinite number of earth-based constructions in which the techniques of adobe and bahareque

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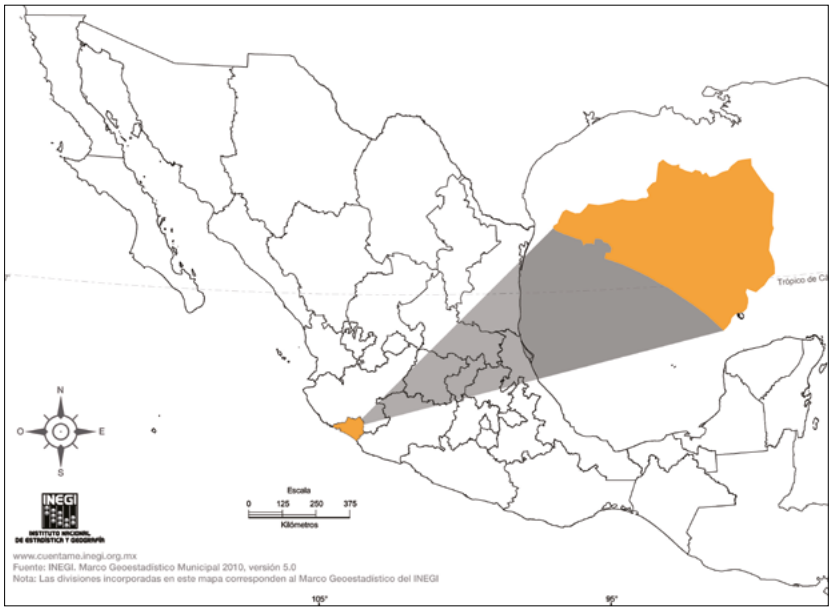

FIGURE 1. Location map of the state of Colima, Mexico (Source: Municipal Geostatistical Framework, version 5.0, National Institute of Statistics and Geography (Inegi, 2010).

(*pajarete*) were mainly used[1], with tile or palm covers. These types of buildings were common for several centuries because they were suitable for the climate of the region: the hygrothermal conditions of the earth were of great importance to the inhabitants of these places with a hot climate.

The territory that currently comprises the state of Colima has been the seat of populations of different origins, and, for the same reason, cultural syncretism is evident in it. Based on the original indigenous systems, adaptations derived from European influences were present, but also some approximations to Asian components, fundamentally of Philippine origin (Gómez, 2015, p. 31). Due to the physical and geographical characteristics of the territory of Villa de Colima, the landowners of the site introduced Africans for the sugar mills. For the production and construction of houses, they introduced "Chinese-Indians" and Filipinos, who, from the sixteenth century, transmitted their knowledge in the use of materials of natural origin and mastery of plant fibers (Vázquez, 2000, p. 101).

The Spaniards who were in the then-province of Colima were uncertain about the use of the materials:

> in most cases, they despised them or could not find a way to impose their language on them, especially in the wide variety of woods for which they had no parallel. Only in the case of the most appreciated species did they manage to impose names

[1] As already mentioned, in the state of Colima, the construction technique of bahareque is known as *pajarete*; it consists of placing a network of sticks or *otates* that have a covering called *enjarre* (plaster) with clayey soil.

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related to their appearance, such as *rosamorada*, because of the color of the flower, or *granadillo*, because of the color of the wood in the center of the trunk (Gómez, 2008, p. 26).

In Colima, the typologies of traditional architecture have had their characteristics determined by their location and historical period; what the architectural contributions have done is to preserve the buildings and create living spaces for the population. "The cultural tradition provides the technology to use, take advantage of, and transform the materials according to procedures and construction systems, and the ways in which their owners solve the problems presented by the climate and the economy" (Prieto, 1978, p. 18).

The construction techniques are characterized by the use of the natural resources of the region and the adaptation of the spaces to the dimensions of the materials of natural origin, like the coconut palm, *otate* (a native Mexican bamboo), grass, and wood for the placement of columns, beams, and trusses, among other elements. Likewise, the construction technologies originating in European civilization consist of the use of adobe and brick, with covers of beams and flat roofs and sloping roofs with tiles, whose structural component is mainly wood for posts and columns (Huerta, 2001, p. 14).

In the state, the difference between rural and urban dwellings is evident due to functional distribution and spatial requirements. The former stand in ample spaces and, consequently, their design corresponds to a more open way of living, related to the countryside, the orchard, the corral or pen, and the kitchen on the outside, without the need to have a confined space. This type of dwelling, although it is related to the neighboring one, lacks a direct connection, and therefore there is no forced alignment or precise dimensioning. By contrast, the buildings in urban and semi-urban areas are adjusted to defined layouts and comparatively small plots of land, respecting the alignment of streets or paths that interconnect them. Green areas are reduced almost to a minimum and, although they sometimes maintain productive functions, these are carried out privately within the blocks and premises.

In the population centers, mainly in the regions located in the valleys, the use of adobe, with tile roofs, was common. Conversely, on the coasts and in mountainous areas, *pajarete*, with palm, and grass roofs, was widely used (Reyes, 2000, p. 153). Cultural exchange originated the introduction of buildings with their own identity, which have survived over time as a symbolic reference and regional identity.

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Unfortunately, external influences and government assistance programs have affected these components, so that today many homes, mainly in their roofs, have been altered by the use of galvanized metal sheets or other commercial materials.

Currently, some governmental and private organizations are considering the introduction of globalized images of architecture and urbanism as part of a supposed contribution to modernity in the cities, which has gradually transformed the homogeneity of housing architecture that prevailed until the mid-twentieth century, with increasingly more buildings erected with industrialized materials and designs alien to the context. There have been ruptures in typology, heights, and proportions that drastically affect the urban landscape with foreign elements, lacking the local identity of the region, which also lead to damage to nearby buildings during construction or earthquakes, which are frequent in the area.

Presently, the heritage buildings constructed in the state with earth are becoming scarcer, mainly in the urban centers, where modernity has taken over the old constructions up to the brink of extintion. The dilapidated state and abandonment of many of them as a result of earthquake damage, as well as the lack of political and social measures that emphasize the protection of buildings, have created rundown sectors of the city that not only affect their value but also lead to unsafe and unhealthy conditions.

Abandoned structures are demolished to make way for vacant lots often used as parking lots and which, in a short time, give rise to the development of new buildings constructed with materials and construction systems that are alien to the site both from the aesthetic point of view and in terms of structural behavior.

REGIONAL *PAJARETE* CONSTRUCTIONS

According to Reyes (2000), in the state of Colima, *pajarete* houses have been characteristic of the three geographic regions that make up the state. Some similarities and differences have been identified, mainly regarding the materials used and the presence or absence of certain elements that make up the building.

Pajarete has been the result of the inventiveness of the different ethnic groups[2] that arrived in the western region of the country

[2] In the western Mexican state of Jalisco, the native peoples are the Wixaritari, also known as *Huichols*, and the Nahuas; the Wixaritari live in the north of the state, specifically in the municipalities of Mezquitic and Bolaños, and a minority in Villa Guerrero and Huejuquilla el Alto; while the Nahuas are distributed in various locations in the municipalities of Tuxpan, Cuautitlán, Zapotitlán de Vadillo, Villa Purificación, Tuxcacuesco, and Tolimán, in the south of the state. In the state of Colima,

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and, with the use of techniques and earth materials, woods, and vegetable fibers existing in the area, created a syncretic form of architecture. Nevertheless, a general pattern was identified in the process and the construction elements used, as well as the use of techniques that, with the support of basic tools such as shovels, picks, and machetes, have been developed in an artisan way.

The morphology of the buildings is composed of a lower orthogonal prism, responding to the cubic shape made by the walls when the vertical structure is closed. At the same time, the upper part forms a rectangular prism that creates the traditional gabled roof. In the houses that still exist, or that have been erected recently, some models of expansion of the buildings have been recognized, like the extension of the roof or the addition or repetition of the entire structure without the placement of the walls, creating communal meeting spaces (Figure 2).

FIGURE 2. *Pajarete* house located in the rural area of Pueblo Nuevo, in Villa de Álvarez, Colima (Photo: Antonio Flores, 2016).

the existence of a Nahua population has been identified in some localities of the municipalities of Ixtlahuacán, Colima, Manzanillo, and Armería (Rojas, 2007).

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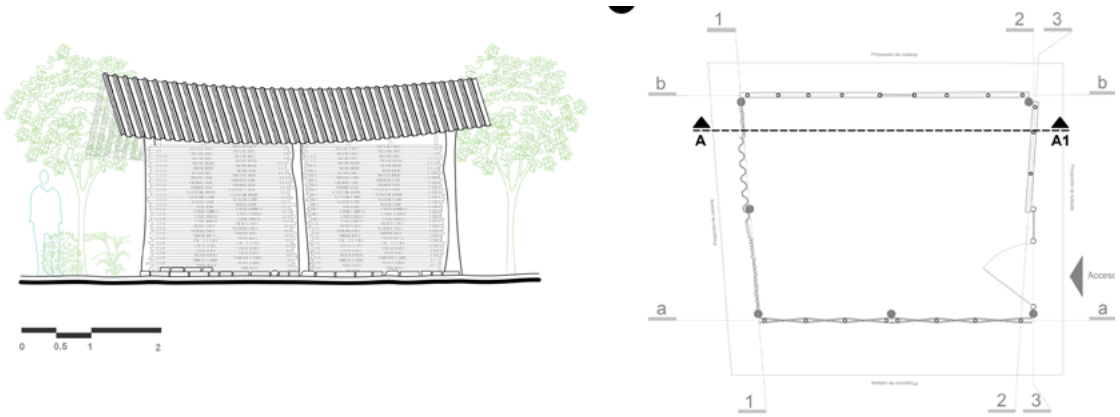

FIGURE 3. Elevation and architectural plan of a *pajarete* housing module located in the Valley zone of the state of Colima (Drawings: Antonio Flores, 2017).

Depending on the use of the spaces and the physical or geographical conditions, the lattice have been partially or fully covered with successive layers of clayey soil, mixed with water and vegetable fibers. Because the construction materials used for the manufacture of *pajarete* have existed in abundance in the western region of the country, where the state of Colima is located, this type of building has been historically accessible both in terms of construction and cost (Figure 3).

Ventilation of the interior spaces has been achieved utilizing small, grid areas which have not been filled in, thus ensuring air circulation. The same is true of adobe houses: the half-timbered walls were often lined with earth and finally painted with lime in natural colors or with mineral pigments.

A wide variety of woods has been used in these constructions, depending on the length, thickness, or strength required. "The columns to support the structure needed to be long, of medium thickness, and resistant to the rot caused by humidity and fungi, as well as to termite infestations.[3] Fortunately, there was no shortage of trees with these qualities" (Reyes, 2000, p. 153). According to Alcántara y Gómez (2015), the Colima region has been characterized throughout history by the abundance of natural resources, among which is the diversity of wood[4] used for the construction of the homes (Figure 4) of the local inhabitants.

[3] Termites are insects that live in tropical areas and usually live in nests, feed on wood, have a chewing mouth and have two pairs of wings.
[4] The wood species in the region are: blue mahoe (*Heliocarpus terebinthinaceus*), barcino (*Cordia elaeagnoides*), tepemezquite (*Lysiloma divaricata*), llorasangre (*Bocconia aroborea S. Watson*), coral (*Caesalpinia platyloba*), cueramo (*Cordia eleagnoides*), cuatillo (*Diphysa floribunda peyr*), kidneywood tree (*Eysenhardtia polystachya*), and tepehuaje (*Lysiloma acapulcense*) (Reyes, 2000).

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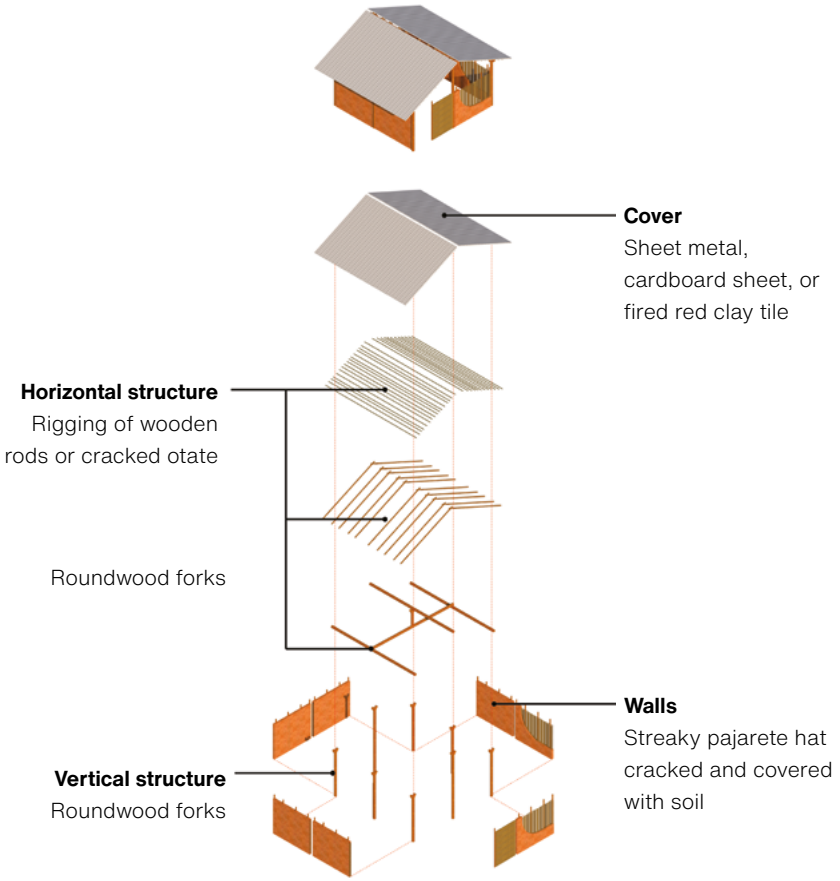
FIGURE 4. Integral explosive plan of a housing module built with the *pajarete* construction system (Diagram: Antonio Flores, 2018).



The roofs, made of grass, were sloped, gabled, and placed on a rudimentary wooden structure; they were tied and interwoven to be placed on the structure of the *latas* and the trellis. The grass used in mountain and valley areas was different from that used in coastal areas.

CONSTRUCTION PROCESS OF *PAJARETE* IN COLIMA HOUSES

The main feature of the construction technique is the placement of a structure of posts made of round wood or columns planted directly in the ground, although in some cases they have been planted on a stone foundation. The posts are used to support the roof and to confine the walls so that the separations between these vertical supports are covered with interwoven surfaces of wood, straw, *otate,* or reeds. In order to begin the analysis of the composition of the structure of the *pajarete* constructions, this work starts with the foundations, as they are the initial section for the construction of the dwellings.

The foundations are executed in a rudimentary manner through a series of independent excavations made directly in the ground

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with a depth that varies between 20 and 70 cm, depending on the function and characteristics of the vertical elements that remain embedded in the surface of the ground. For example, in the case of the columns whose function is structural, excavations have a depth between 50 and 70 cm. When the element is a shelf that has the function of stiffening the walls, the excavation depth is between 20 and 30 cm. Once these elements are in place, the voids are filled with the same earth, which is pressed down to give greater firmness.

The following procedure consists of placing the vertical structure, composed only of round wood columns obtained directly from the trees in the area; it is worth noting that they do not receive any kind of treatment for their protection. According to the builders of *pajarete* houses who still know the technique, the cutting of the wood happens during a *Luna Tierna*[5] and in the evening, the time of day when tree sap is found in the roots and not in the trunk or branches, which is why the wood already has protection from insect attacks. This tradition finds a scientific explanation in the metabolic process that all plants develop, as well as in the effects that the moon has on them.

The diameter of the vertical elements varies between 10 and 25 cm, with a height between 1.50 and 2.85 m. A distinguishing characteristic is that in the highest part it has a Y-shaped bifurcation—resulting from the natural shape of the branches of the tree—whose purpose is to receive the elements of the horizontal structure. There are four types of wooden columns: corner, central, trestles, and *dominguejos* or upright supports. Corner columns, as their name suggests, are placed in the corners, while central columns stand in the center of the buildings; both have an average height of 1.65 m. The trestle supports are the tallest and give the shape of the gable roof. Finally, the *dominguejos*, or upright supports, are the only ones that are not driven directly into the ground, but into a floor slab of the horizontal structure; with an average height of 40 cm, they have two functions: the first is structural and the second consists of reducing the material used.

The columns have the function of supporting the roof, which is placed over the Y-branches. The structure of the roof, like the previous structure, is mostly made up of round wooden posts with smaller diameters: they range from 10 to 15 cm. First, the floor slabs are placed on the corner and central columns, creating a pe-

[5] Colloquial expression of the inhabitants of the rural areas of the state of Colima to refer to the moon in its waning phase.

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FIGURE 5. Detail of floor slabs underpinning the columns of the vertical structure and wire ties (Photograph: Antonio Flores, 2016).

rimeter ring that links the whole structure; then, the horizontal trestle support is mounted on the vertical trestle supports (Figure 5); *latas* are placed between this and the floor slabs. Perpendicularly to the *latas*, a wooden or *otate* grid is placed, with an approximate dimension of 3 to 6 cm in diameter, forming a grid on which the roofing material rests.

In the past, roofs in coastal areas were made of grass or palm leaves, but nowadays it is possible to identify cardboard, asbestos, galvanized, or clay tile roofs as elements added to the original constructions.

The walls that enclose the structure are erected with the *pajarete* technique, which consists of placing a series of vertical wooden or *otate* shelves with an approximate diameter of 4 to 8 cm, driven directly into excavations that are in the ground, every—more or less—60 cm. However, this spacing may vary depending on the distance to be covered and the length of the existing material. These elements function as a warp for the creation of a fabric, on which flexible wooden rods are woven (Figure 6), such as bay cedar or pieces of *otate* cut in half to reach the necessary height.

As the rods or *otates* are woven together, a filler composed of wood and *otate* residue is placed between the resulting empty spaces in the lattice, which are usually thinner and provide stability to the wall. Finally, a finish of earth mixed with water and some vegetable fibers, such as grass, is placed, the thickness of which varies between 2 and 5 cm (Figure 7), although in areas with higher temperatures this step is regularly omitted in order to allow ventilation inside the dwelling.

The identified carpentry work, which is rudimentary, is very scarce and present only in doors and windows. These consist of a round wooden frame on which strips of cracked *otate* are placed continuously in a vertical direction. In the most recent construc-

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FIGURE 6. Comparison of two materials used for the framework of *pajarete* walls. Left: wall interwoven with blue mahoe; right: wall interwoven with open *otate* (cracked) (Photograph: Antonio Flores, 2018).

FIGURE 7. *Pajarete* house located in the community of Pueblo Nuevo displaying the walls of *otate* and the presence and absence of earth as a finish (Photo: Antonio Flores, 2016).

tions, it is possible to identify a variant where the round wood and the *otate* are replaced by commercial sawn wood, which is a contemporary adaptation. In both types of doors, no conventional

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hinge system is used, because a conical-shaped part of the corn mill is buried directly in the ground and serves as a rotation axis.

As for the windows, only commercially available sawn wood frames are identified to delimit the span and hinge the leaves; although there is great similarity between the leaves of the windows and those of the doors, the builders and inhabitants of the houses claim that it is a contemporary adaptation (Figure 8).

FIGURE 8. Detail of the type of window used in the *pajarete* houses in the Valley zone of the state of Colima (Photograph: Antonio Flores, 2016).

The layout of buildings usually corresponds to composition axes that are governed according to the uses of the spaces; linear, L-shaped, and grid axes were identified. The spaces that a *pajarete* house generally has are rooms, meeting or resting places, kitchen, cellar, and sanitary facilities; individually, they are usually orthogonal floors with four sides that respond to a square and a rectangle, or the intersection of both figures, creating floors with more than four sides.

Some dwellings have two entrances and an interior division, although free floor spaces predominate (Figure 9). The most accurate description of traditional *pajarete* housing in Colima is by Juan Carlos Reyes:

> The house was probably a one-bedroom, single-access house with no windows. Inside, one side was occupied by the kitchen, which consisted of the fireplace, as the wall is known locally—built of sticks and covered with a mixture of mud and ash—with the *tenamaxtles*, stones that were used to put the pots and the comal on the fire, either integrated or superimposed (Reyes, 2000, p. 151).

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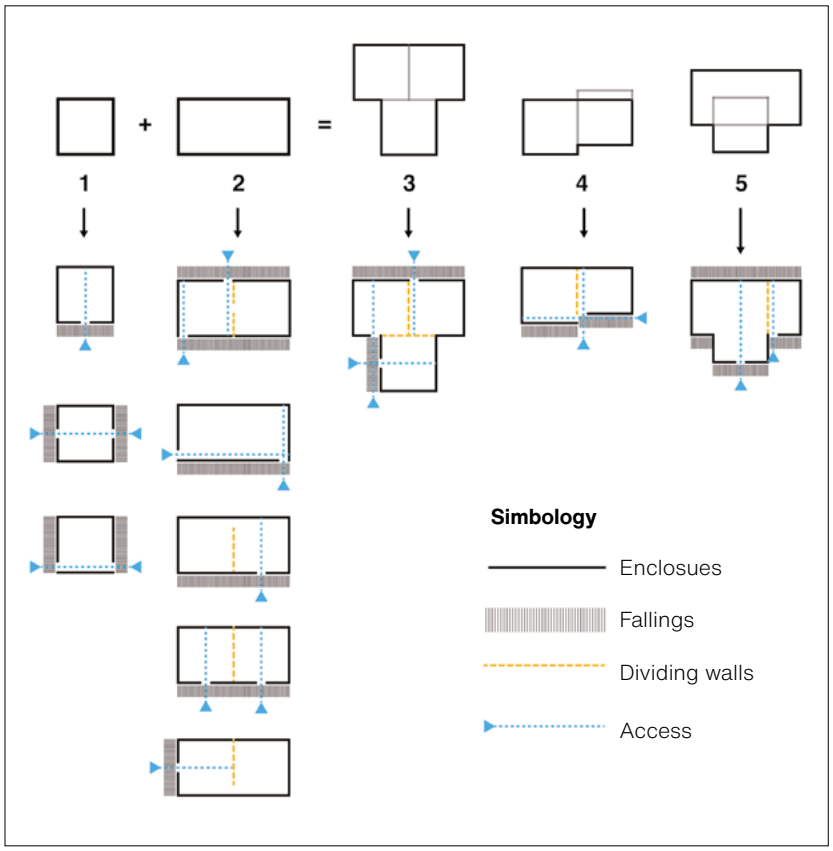

FIGURE 9. Organizational diagrams by architectural unit in *pajarete* houses (Source: Adapted from Fonseca and Saldarriaga, 2018).

Today, a large number of alterations are present in *pajarete* houses (Figure 10), which shows their vulnerability to the excessive introduction of industrialized materials and construction systems that are used because they are considered durable.

THE VULNERABILITY OF EARTHEN ARCHITECTURE IN THE 20TH CENTURY

Excessive population growth in rural areas began in the 20th century, which led to the disappearance of the traditional earthen architecture and gave way to industrialized elements and materials that, with new forms and finishes, altered the typology and architectural characteristics of the region. This has led to the gradual disappearance of the historical and cultural legacy of the state of Colima; likewise, the urban and housing policies implemented have encouraged the appearance of large housing complexes unrelated to the context, designed and built without understanding the climatic and cultural conditions of the area.

The technological innovations of the early 20th century have brought about considerable changes in architecture. The introduction of the "railway also allowed the entry of new materials such as

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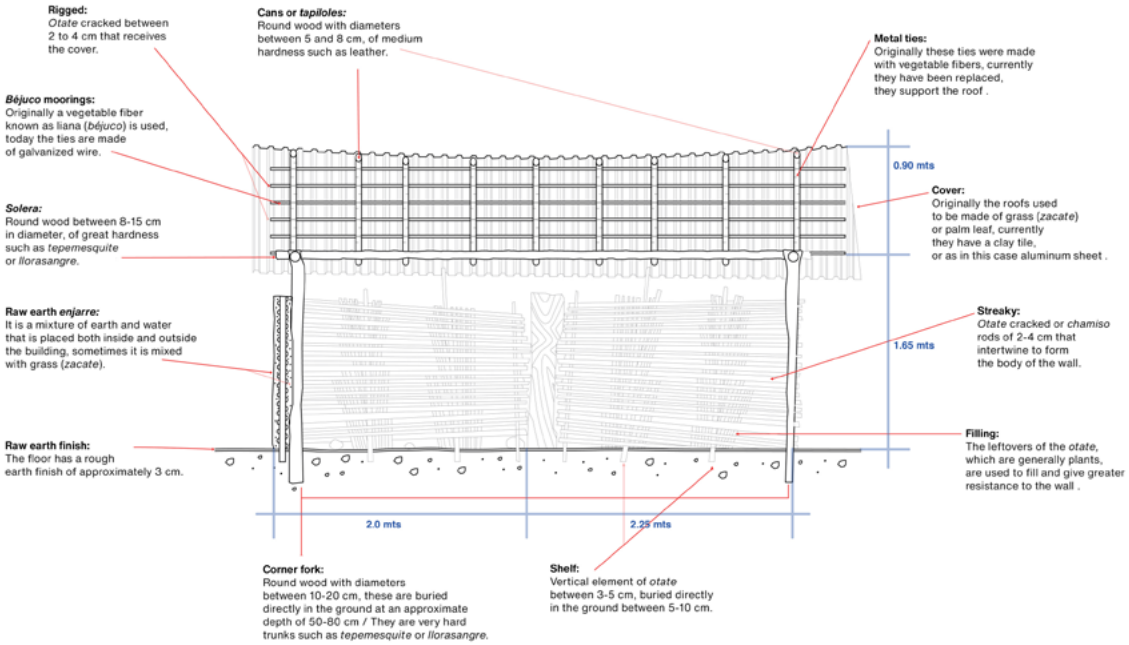

FIGURE 10. Cross-section of the facade of a *pajarete* house in which the construction system can be seen in detail (Drawing: Antonio Flores, 2017).

steel and cement. There is evidence that cement began to be used in the construction of some downtown sidewalks at the beginning of the 20th century" (Mestre, 2011, p. 25). In 1906, cement began to be used in the construction of some houses and sidewalks, while in 1907, the introduction of steel became evident, with the construction of the De la Madrid market, where modifications gradually became apparent. By contrast, the architectural styles developed during the 16th century tended to change little over several centuries (Correa, 2000, p. 54).

In the architectural and urban aspects, there were significant changes when the materials of natural origin that were used with traditional techniques were displaced by prefabricated materials that have been industrially processed and require technological infrastructure for their use.

> In addition to the introduction of these new building materials, since the beginning of the century there has also been a popular trend to replace houses built with perishable materials (adobe, wood, mud, sticks, and other perishable or waste materials) with others made of stone materials (brick, partition wall, block, stone, or cement), which are more durable and resistant over time (Mestre, 2011, p. 25).

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The loss of traditional architecture in Colima happened early in the 20th century. Mestre states that for 20 years, the number of houses built with prefabricated materials increased considerably. In 1930 there were 1001 houses made of industrial materials, while in 1950, there were already 4 170 in the state (Mestre, 2011, p. 25).

Today, the image of many of the buildings erected with raw earth in the downtowns of Colima is one of abandonment, where ruins are common and only leave a memory of the time of splendor of its streets and houses. Some of the buildings that survive do so with radical modifications that, in addition to altering their original structure, put at risk their stability, while those optimally preserved are the minority.

FINAL CONSIDERATIONS

The development of raw earthen architecture in the different towns of Colima follows the same pattern, rejecting the construction tradition that leaves buildings built with these techniques in a state of abandonment and ruin, and giving priority to new constructions with industrialized materials that neither fit into a local typology nor naturally and optimally resolve the climatic conditions.

The constructions conserved in good condition serve as an example for the analysis of the materials and construction systems of a specific period. Unfortunately, the disappearance of historical architecture in the state of Colima is not only concentrated in earthen buildings, but also encompasses other typologies, periods, and styles; the case of traditional housing is the most representative, having been the most abundant and the most vulnerable.

Earth has been used in all kinds of buildings. However, it is often found in residential architecture, through the use of construction traditions, due to the vast number of existing samples that represent history in their walls, remaining as a witness of the history of a region. Unfortunately, this category is also the most vulnerable, since it lacks protection measures, so its survival is subject to the goodwill of the owner.

Traditional architecture has shaped the urban image of towns, giving them an identity in which the skill of their builders can be appreciated, as well as the generational work that has taken place in the towns, where the oldest houses were, through the transmission of experience and skill of their creators, the school of the most recent ones. Traditional architecture embraces a legacy transmitted in a contained space, that is, the village: a melting pot of wisdom, techniques, customs, traditions, and teachings that are transmit-

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ted from generation to generation; activities that take place under the protection of earthen walls, silent witnesses of daily events.

Traditional building systems such as *pajarete* are of great importance because they bear witness to the development of peoples, their uses, and customs. Their importance is also due to the wealth of knowledge inherited and transmitted from generation to generation, in which the properties of materials and adaptation to the environment have been naturally revealed for survival, without the need to alter the immediate context to any great extent.

According to the case studies analyzed throughout the three geographical regions that make up the state of Colima, it is possible to conclude that the construction system of *pajarete* houses is the same, regardless of the area in which it is implemented. They share certain general similarities that define a specific type of housing as a typology, which corresponds to a cubic body and a gabled roof. These houses also share the shape of the orthogonal architectural floor plan, as well as the isolated organization of spaces. However, there are also a series of key differences that correspond to a construction logic conceived from the adaptation to the natural environment where they are built.

The above differences relate mainly to the materials used for construction. Although in the three geographical areas the use of wood and vegetable fibers is predominant, the varieties used are different. On the coast, blue mahoe is used to weave the walls and *barcino* for the vertical structure, while in the valleys and mountains, *otate* is predominant in the weaving of walls and *tepemezquite*, coral, *llorasangre*, and *coatillo* for the rest of the structure. This situation corresponds to the varieties of each specific context.

One of the differences identified is the use of earth as a plaster on the woven *pajarete* walls, because, in mostly warm climates such as the coast, the houses do not use this material much to favor the ventilation of the interior, whereas in cold climates, such as the valleys and the mountains, its use predominates.

At present, transmission of knowledge has been lost in construction projects that do not have any regard for the environment, implementing technologies that consume energy resources that could be omitted if traditional systems were taken advantage of, understood, and recovered, adapting them to modern life.

Both rural and urban housing were developed as a response to the conditions of use, place, and activities that the inhabitants dealt with in each period to adapt the spaces appropriately. According to Huerta (2000, pp. 15-29), historically, the existing resources in the

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area have been optimized, generating comfortable and functional spaces that favor family coexistence, and also rest, privacy, and shelter. The above led to a gradual and unconscious attachment of society to the land, resulting in local identity, which can still be seen in the lifestyles of the original inhabitants of the region.

With the advent of modernity and different ideologies, the value of heritage was minimized, which, when combined with the damage and deterioration it suffered, has condemned it to abandonment and, if action is not taken quickly, to its imminent disappearance.

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