

Cultural Considerations: Ecolodge in Mexico

Logan Saldivar
May 2012

Submitted towards the fulfillment of the requirements for the Doctor of Architecture degree

School of Architecture
University of Hawai'i

Doctorate Project Committee
Spencer Leineweber, Chairperson
Chris Rice
Christine Beaulé

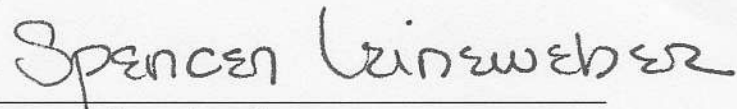
Cultural Considerations

Ecolodge in Mexico


Logan Saldivar
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We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctor of Architecture in the School of Architecture, University of Hawai'i at Mānoa.

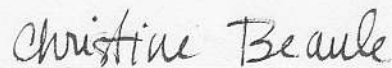
Doctoral Project Committee



Spencer Leinweber, Chairperson



Chris Rice



Christine Beaulé

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Abstact

ABSTRACT

A trend of extensive globalization and homogenization of architecture and culture is occurring. As globalization increases cultural identity in architecture becomes more precious; the need to create a distinctive sense of place becomes more desirable. Investigative research on cultural considerations will create a deeper understanding of a people and their culture. This research explores the indigenous roots of the Chihuahua, Mexico responding to aspects of physical constitutes, sustainability, history, culture, environmental policy and adventure tourism.

First, the research investigates geographical and environmental components that immediately influence the region and analyze how these qualities make the site unique. Next, the research studies the history of this indigenous community, from its beginnings of a modern civilization to the current state of being. Similarities found in past and present can give core relations to how buildings respond environmentally and socially to use. Insight gained from research helps to better understand the needs and lifestyles of the Chihuahuan people. The dynamics of these users reveal how architectural form can better accommodate their social interaction. Finally, the research promotes and supports the design of a boutique eco-hotel within the rural community.

Doctorate Project Statement

PROJECT STATEMENT

The importance of creating architecture that responds to the region's climate, culture and users sometimes seems like a lost practice. In a world of star-architects whose designs are marketed worldwide, similar buildings are erected globally. There is less concern for designing with a cultural response. What has happened to the deep cultural roots on which architecture was once based upon and represented?

Architectural styles have been a part of cultural representation throughout history. Not only is it an icon of the place but shares key characteristics of how families and communities interact with one another. What once was a practice passed on through generations of builders now seems like an industry of instant commodity. Tracking history of each place back before detrimental influences can encourage a push toward returning to cultural roots. It is important to create places that are unique unto themselves so that people are inspired to emerge themselves in culture other than their own.

In an attempt to understand the cultural implications that affect a design project, the research will focus on Chihuahua, Mexico. Then the scope is further narrowed to a national park to build an eco-hotel. Understanding the unique environmental conditions in which the park resides, along with sustainable practices needed to make the spaces comfortable, and leaving a minimal impact on ecosystems are the initial steps in discovering building form. These portions of research are tangible, while others such as history and cultural impact on architecture have freedom of interpretation.

Instead of recreating examples of past works, one can justify design decisions through the use of principles based from ancient ruins or social stratification. As a result, the spaces not only respond better to how the users interact, but it also continues to encourage the basic cultural characteristics. Finally, in any design there has to be set of limitations that help control expansion and maintain a desired capacity. The use of policy and understanding of adventure tourism can set expectations to abide by in the future. Limiting the number of people visiting, the activities permitted and over all consumption

determines the atmosphere that will be maintained.

The completed research can be a precedent that exhibits the importance of understanding a region's architectural design through its culture, history and users. These are key factors that make a place different from anywhere else, and highlighting these creates a special place. It provides the opportunity to share something deeper about the place, whether through space, organization, or materiality. Every place has unique characteristics that take time and experience to understand; it becomes very hard for an outsider to quantify every aspect in a culture other than their own. The exploration of cultures is highly encouraged before designing in an unfamiliar place. To better understand daily activities and human interaction one must immerse and apply themselves into a culture. This provides a specific knowledge base that is difficult to document in a series of facts. Someone would design a lot more sensitively after learning about the region it resides.

Interpretive historical research covers a narrow scope of the north central state of Chihuahua in Mexico with specific emphasis on Cumbres de Majalca National Park where the design project will take place. Important cultural aspects that are unique to Chihuahua's climate, history and adventure tourism niche create a sense of place that unlike anywhere else. History and cultural roots give insight to how people responded to the environment and conditions before modern technology. These insights often reveal architectural strategies that have been lost along the way or only live on through oral accounts. There are more rare places of natural beauty and architectural preservation become the more tourists want to visit these places. With increased activity around the sites it often disturbs the natural beauty and resources that once existed.

The future lies in the way the state addresses sustainability and environmental policy in the future will dictate the length of time that the natural environment will be able to support the growing amount of tourists in these areas. Responding to ecological aspects that range from water consumption all the way to microorganisms permit lasting systems that can continue without detrimental interruption. One must have a familiar

acknowledgement of the area to understand the intricacies of systems, links between air, water and land before intervening in the system.

Research Document

Chapter One

PHYSICAL CONSTITUTES

Location, climate and geographical factors are factors in what distinctively separates places from one another. The location of the site dictates a greater regional, macroclimate type. While a site specific microclimate, influenced by geographic features that alter sun exposure, humidity, biological conditions and wind and rain direction. Based on both climate factors the building can respond through its materials, orientation, and integration into the landscape. Controlling temperature and humidity in interior spaces are the first components that directly influences human comfort.

The site of interest is located in a national park located in the state of Chihuahua 55 miles northwest of the capital city of Chihuahua illustrated in Figure 1. The park's location in Chihuahua dictates a particular climatic and environmental attributes. Researching the unique physical conditions in the park is a guide to implementing particular sustainable practices and cultural implications of the location.

Location

Northern Mexico's geographical coordinates and climatic conditions can be similar to continents like northern Africa. However in Chihuahua there are a unique landscape conditions caused by mountain ranges and plateaus creates an environment like none other. The importance of understanding physical and climatic variations of the landscape give incite to how to approach a region architecturally.

The specific region of interest is the state of Chihuahua, the largest state in Mexico, 94,960 square miles.¹ It is located on the northern boundary of Mexico, bordering US states of New Mexico and Texas. Neighboring Mexican states are Sonora to the west, Durango to the south and Coahuila on the eastern border. Primary physical features with in Chihuahua are the Sierra Madre Occidental runs along the western portion of the state, with high plateaus in the central corridor and arid desert along the eastern side. Chihuahua location is important because of its diverse climate types and its

1 Schmidt, A Geographical Survey of Chihuahua, 6.



[Figure 1] Location of Summits of Majalca National Park in greater Mexico direct relationship to the United States.

The location is a unique transition along country boundaries and physical constitutes. Due to Chihuahua's direct relationship with the boarder of the United States. There are many families who forge their lives in both countries and find the national boarder to be similar to state boarder. Although there are many people who are able to legally able to work, study and visit interchangeably there are many more people who cannot. This has caused high stress and contention between countries and has affected the way average people can travel across the border, especially between El Paso and Juárez. Despite all efforts to physically separate the countries there are common cultural ties between that bind the two places together.

The country boarder creates an inevitable connection that many families have to grow accustom to travel between boarders. Responsibilities like raising a family, job opportunities or higher education often create frequent trips back and forth.

The geographic location of the park does not limit the nationality of guests, however it is more probable that guests would be domestic tourists based on the study from chapter seven's *Perception on Tourist Destinations*.

Chihuahua's geographical location makes for a remarkable cultural transition between the United States and central Mexico. Similarly Chihuahua shares many physical features such as the Chihuahuan Desert and central plateaus that continue into western Texas and southern New Mexico. It goes to show that man made borders do not limit physical geographical features or cultural aspects of a place.

Climate

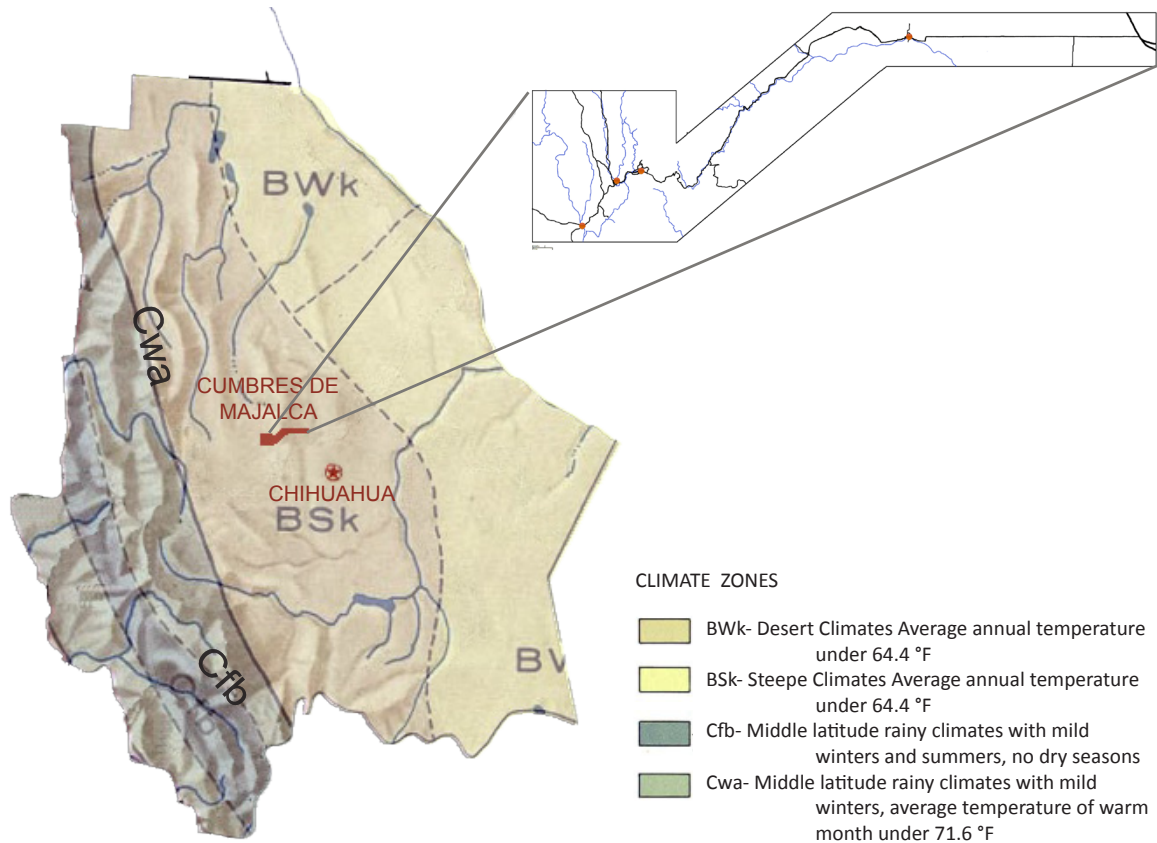
The climatic transition in between the Chihuahuan Desert and the Sierra Madre Occidental Mountains creates a unique conditions worth preserving. Figure 2 demonstrates the transition from arid desert conditions meet the cooler rainy high mountains the climate adjusts to accommodate landscape changes. Climatically this zone is important to illustrate the transition between hot arid conditions to cooler elevations with substantially more rainfall. Mexico has reserved Cumbres de Majalca National Park for its unique preservation of this environmental transition and is preserved for biological study and reforestation of the region.²

The park encompasses nearly 12,000 acres with elevations ranging from 5,347 feet to 7,808 feet. The elevation changes are very distinctively in this area, to capture various components between the desert and mountain climates. The ranging temperatures for an annual year are from 81°F to 18°F and summer monsoons can bring large amounts of rainfall that can cause flooding.³

The climate within the park can be categorized into three climate types. Regions of elevation below 5,000 feet, where the park entrance is located off the main highway onto the dirt road, the climate is dry and warm. The average temperatures range from 64 to 77°F with annual precipitation between 7-11 inches. This region represents the beginning of the journey into Majalca and is representative of the periphery of the

2 Estrada-Castillon, . Southwestern Naturalist, Vol 48 No. 2, June 2003. pp. 177-187.

3 Estrada-Castillon, . Southwestern Naturalist, Vol 48 No. 2, June 2003. pp. 177-187.



[Figure 2] Climate Zones in Chihuahua, Mexico

Chihuahuan desert. As the journey continues to elevations between 5,000 feet and 6,500 there is a shift to dry temperate climate with warm summers and annual mean temperatures between 68 to 82°F. This region encompasses the majority of the winding dirt road up to the summit. Once reaching the highlands, elevations above 6,500 feet, the climate is temperate with temperatures between 54-61°F and an annual rain fall of 15-20 inches.⁴ These higher elevations mark the summit of Majalca, where the main village is settled.

Based on Richard Hyde's book, *Climate Responsive Design*, there are three basic climate responsive design strategies: ordering and prioritizing strategies, grouping strategies into active and passive building models, and selecting strategies appropriate for those models and climate types. His systematic approach to climatic design addresses the most general and possible strategies in the region to most specific

4 Estrada-Castillon, . *Southwestern Naturalist*, Vol 48 No. 2, June 2003. pp. 177-187.

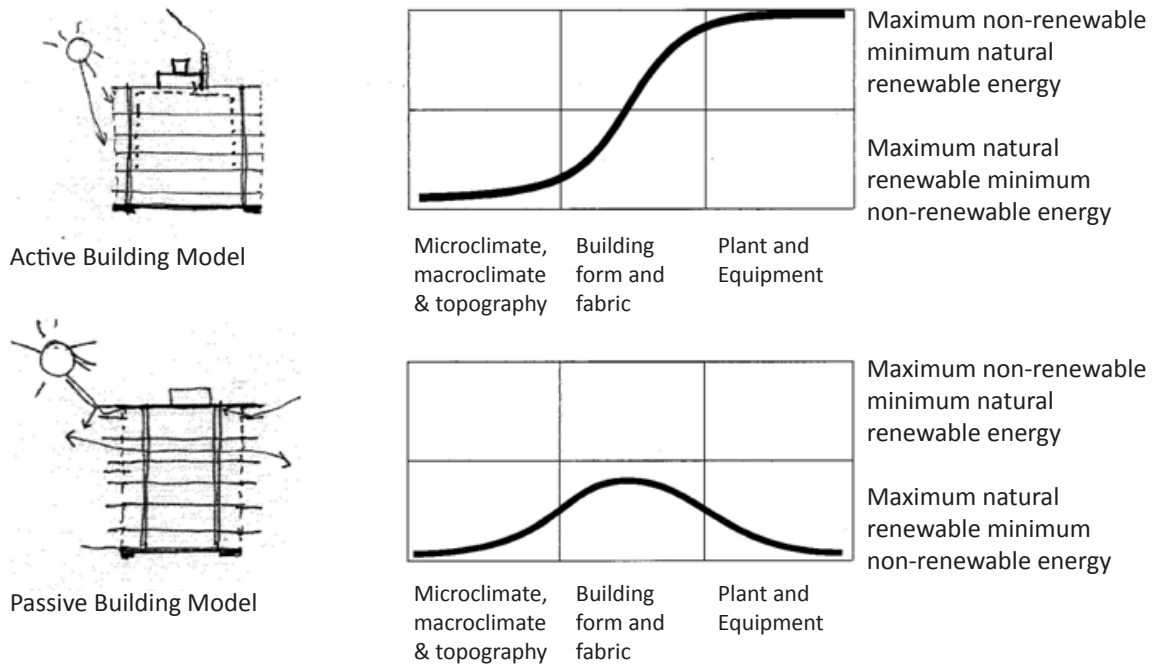
Ordering and prioritizing strategies is the first step in the decision making process, understanding the best possible strategy will dictate its level of importance and priority. Then a designer must group strategies into active and passive building models, the first layer of consists of macroclimate, microclimate and topography.

The macroclimate is the general environment defined as a transition between desert and mountains with plateau climates, averaging annual temperatures of 64.4°F. The microclimate is more specific to the exact site, how the wind moves around any surrounding rocks or if nearby water causes passive cooling or reflective light. Topography, as well as the orientation of a building, influences how the climatic forces impact the building. The second layer, defined by Hyde, consists of the building's form and fabric which filters the initial impact of climatic forces on the internal spaces. The final layer of is the finest level of control, the external components such as impacting vegetation and possible devices to filter climatic forces passing into the internal spaces. It is through the integration of all these filters that can create an optimized climate responsive design, maximizing benefits and minimizing detriments of climatic forces.⁵

Climate responsive design strategy can be grouped into active and passive building strategies. The two main sources of energy are renewable and non-renewable energy. Non-renewable energy, are energy producers which cannot be replenished at the rate it is consumed. Renewable energy on the other hand is the uses unlimited natural resources, such as sunlight, wind, and rain, which are naturally replenished at a higher rate than it is consumed.⁶ It will be necessary to design with renewable energy models in Cumbres de Majalca because it is not connected to mainline power source. All energy produced by renewable sources will go toward heating water, lights, cooking, refrigeration and any other commodities necessary for living. What cannot be produced by natural energy will need to be produced by a generator, which are very noisy and contain many non-renewable products.

5 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 22.

6 Stein and Renolds. *Mechanical and electrical equipment for buildings*. 151.



[Figure 3] Passive and Active Systems in Buildings

According to Figure 3, the passive building model requires the predominant use of renewable energy, which depends heavily on the building form and fabric. Active building models, on the other hand, depend more on non-renewable energy. Besides the required use of non-renewable resources, the main problem with active systems is they often ignore the building context and the form and fabric and tend to rely mostly on the surrounding plant and equipment, which result in poor energy efficiency.⁷

The importance of building with climatic responsive design in mind will eliminate unnecessary energy for additional heating or cooling. The goal for the boutique ecolodge in Majalca is to use the right materials, orientations for wind and light to make design that will make the space most comfortable. One must do detailed studies of the area to fully understand the components that contribute to the optimal location for wind, light and shade. The following research is basic strategies such as wind, sun orientation and how the specific building form like roof and walls can help reach a passive building model. These strategies will aid in site analysis in the design phase.

7 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 56.

Passive Design Strategies

To successfully respond to a passive heating and cooling in a semiarid climates many considerations need to be taken in the building form. Understanding external factors of climate, topography and ecology are primary considerations analyzed in creating a passive building model. Once the site is selected, the microclimate of the site is imperative. Finding wind patterns throughout the site to better analyze the effects on and through the building. Considerations for the additional loads need to be accounted for wind speed, path and frequency. The direction of wind creates positive and negative forces on the building structure. In managing the effects of wind, location, orientation, building structure, and window/door openings play a major role in the development of an efficient design. Based on the orientation of the building, the more the exposure the openings have for wind the better the ventilation. When it comes to the orientation of a building, it is important to know the direction of trade winds for the site during summer and winter seasons.

Building structure is probably the most important factor due to the importance of safety in a building. It is crucial to know the mean speed and frequency of wind at the particular site in order to make appropriate structural design decisions. A designer must also be aware of the three main effects of wind loads that contribute to the failure of a building. These effects are racking, overturning, and uplift. Racking is the rotation of elements in a building, due to the effects of applied horizontal wind loads, which have the potential to cause a building to collapse. Overturning is the rotation of a building as a whole, due to a weak foundation. Uplift is the removal of building elements due to the effects of applied vertical wind loads and the suction effect previously discussed.⁸

Resistance to wind loads is apart of structural safety measures that could be applied to the building design. A braced light frame, or diaphragm, which is basically a stiff plane of material, has the ability to resist vertical and horizontal wind load. Light steel frame and skeletal frame is a post and beam system, which reduces the loads on

8 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 66.

walls, as well as its mass, increasing the passage of light and air into the interior space. Cantilevered columns provide a bracing system for single or two-storey buildings that allows for functional flexibility and open space. Structurally, this system shifts the major point of stiffness to the ground plane, rather than to the first or second floor joint, as would be done in a skeletal frame system. In result, the foundation and column's structural capacity is increased. Shade structures tend to be lightweight and able to span long distances, while maximizing ventilation and providing some protection from heat, ultraviolet radiation, and rain.

Lastly, the size and location of window and door openings determines the amount of wind that passes through a building. The major issue here is that design decisions are based on conflicting factors, such as maximizing ventilation with protection from unwanted elements. Maximizing ventilation requires large openings, whereas protection from unwanted elements, such as solar heat, rain, insects, smells, and noise, require barriers of some sort.

The sun is also a powerful force that fuels life, as well as vision. The major issues caused by the sun are solar heat and ultraviolet radiation, which directly affect thermal comfort, lighting, and energy performance. Thermal comfort is affected by the factors of air temperature, radiation, humidity, and air velocity and movement. In order to address this issue, it is important to measure all of these factors. Fortunately, for this day and age, there are various types of software and technology that can efficiently measure these factors, which help to make informed and efficient design decisions. The issue with lighting is mostly concerned with climate-dependent lighting, or daylighting, in which the quality and quantity of natural lighting are considered. Since daylighting is climate and site dependent, the time line and frequency of natural occurrences, such as clear and overcast skies, must be incorporated into the design in order to create an energy efficient building.

As for energy performance, the overall goal is to minimize energy use in an efficient way. There are two main sides to energy efficiency: demand and supply. The

demand side consists of elements that use power, while the supply side is made up of elements that reduce the necessity of power in a building.⁹ Ideally the difference between energy supply and demand should total zero or have a surplus of supply. In climate responsive design, finding an efficient mix of passive and active systems is also a way of achieving high-energy performance, due to climate responsive design's holistic approach.

Addressing issues related to the sun, shading and diffused lighting are the main solutions to minimizing solar heat and ultraviolet radiation in interior spaces. The first layer that addresses the effects of solar heat gains are adjacent exterior spaces. These spaces include surrounding landscaping or courtyard spaces, each of these elements effect the way they shade exterior walls and how much these outdoor materials reflect or absorb heat. The way these spaces are addressed impacts the internal comfort. The next layer to consider is the treatment of roof and external walls. The amount of exterior surfaces effected by external components and how the way they interact is a major contribution to comfort. Understanding the thermal properties of the building materials used and the form of exterior surfaces can drastically reduce or capture heat. Interior walls also have to be kept in consideration for their thermal properties and ability to keep natural ventilation.

The external wall is a critical element to the building's achievement of harmony in nature, which requires the collaboration between nature, the inhabitants, and the building skin. The main function of the external wall is to regulate the climatic forces. In warm climates, heat is rejected while light and air are admitted. The ideal type of building would allow the admittance of cool air and diffused light.¹⁰ In preparation for extreme wind conditions, it is important to know what the general strategies of window openings are, then focus on the most critical elements of the building that are the most susceptible to extreme wind conditions. For example, the positives of small window

9 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 68.

10 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 161.

openings are the reduction of exposed areas that are susceptible to wind damage. The negative side, however, is that it restricts the access of airflow and ventilation through the building.

For interior elements, such as the floor and interior wall, the position and construction will have a significant influence on the overall performance of the building. Another important factor to consider is the relationship between the floor and the ground. If the floor is adjacent to or connected to the ground, or earth, the earth's temperature will have a great effect on the temperature of the floor. If the floor is suspended above the ground, there is the potential for air movement and increased ventilation through the floor.

Roofs are a challenge to design since it must reduce solar heat gain during the day, but also allow for cooling at night. Materiality and assembly play a large part in the way heat transfers to the interior. The amount of ventilation and conduction of heat through the layers of roof materials are dependent on the climate. Roof inclination and orientation dictate the airflow and ventilation throughout building's openings and roof geometry. If the design intent is to reduce wind loads, the roof height should also be reduced, which also reduces the volume of air for cooling.

Other roof uses can be used to harvest renewable sources like rain and sun. Taking advantage of these natural resources will change the environment and reduce the amount of artificial energy it takes in a household. Green roofs are also used in projects that strive to balance ecosystems. Their impact on environmental restoration makes for rehabilitation of habitats and biological components.

Geography

Climate responsive design and passive strategies are the fundamental principles that go into the design. However, there are more specific aspects about Cumbres de Majalca National Park's geography that makes it a draw to visitors. The increase of rain fall in the highlands region of the park makes the land much more fertile, allowing species of pine and oak forests to grow. Other physical features dramatically change



[Figure 4] El Peñón; Predominant landscape feature in the town of Cumbres de Majalca

at higher elevations, such as its unique rock formations shaped by wind and erosion.¹¹

These formations, like the example in figure 4, are among many throughout the mountainous area of the park and funnel air between canyons, creating cool breezes. These rock formations are very exceptional and appealing for adventure tourist who enjoys rock climbing, camping or hiking. The formations can be reached primarily by cars but to find more, one can take ATV motorcycles or horseback.

When doing a site analysis it will be important to monitor the wind patterns created by the rock formations. The property is full of elevation changes and rock faces that shift the wind in different directions. If one is able to capture gusts of wind during the summer and deter air flow during the cold winters the interior spaces would be extremely comfortable. Architecturally the rock formations are very inspiring and invite the design into the existing spaces between clusters of solid rock. With the existing landscape there are opportunities to create not only interior and exterior spaces but

11 Estrada-Castillon, . Southwestern Naturalist, Vol 48 No. 2, June 2003. pp. 177-187.



[Figure 5] Community water tank filled with spring water



[Figure 6] Wind Powered Water Pump



[Figure 7] River that runs through town

forge the connection between the two to create unification. This connection's purpose is to enhance the natural environment and feel a part of the environment rather than within a confined space. The physical features in the park offer many opportunities to create interventions for boutique units that will offer privacy, views and sense of belonging.

Other canyon formations are created by surrounding rivers such as the Sacramento River that begins in Cumbres de Majalca National Park it merges with Chuisca River before it flows through the capital city of Chihuahua.¹² The river, shown in figure 7, provides fresh water for the people, plants, and wildlife in Majalca and creates a thriving environment. The river also helps define the park boundaries as it flows down the mountain to the park entrance from the main highway. Alternative ways of getting fresh water include digging wells like the one in figure 5 located in the center of Majalca. Most wells in the area have to drill through layers of rock before reaching the water table below, this makes it very difficult to build however the advantages of clean water for showering is much better than pumping water from the river. The river water carries sediment that settles in the cistern and causes a tar build up that often spits out when the cistern is nearly empty. The advantage of a well is consistent pure water to comfortably shower, to wash dishes and clean.

12 Lesueur, Harde. "The Ecology of the Vegetation of Chihuahua, Mexico, North of Parallel Twenty-Eight." The University of Texas Publication 4521 (1945): 13.

The cultural considerations that location, climate, passive design and geographical features, of Cumbres de Majalca National Park and the greater area of Chihuahua, play in understanding the region better. A common theme between the discussed topics seems to show that the site is a blending of many aspects. The transition between nations, climatic zones and passive design begin to inspire a similar transition between architecture and the natural world. The beauty that is evoked in each transition is highlighted as an ideal union between what seems to be drastically different components. The goal is to understand how the fusion between two separate parts creates a richer environment which is worth preserving. The knowledge and inspiration gained from studying the physical constitutes will demonstrate what decisions need to be made in the realm of sustainability for this project. This will help gain a better understanding of how transitional aspects can be incorporated into ecological design.

Chapter Two

SUSTAINABILITY

With regard to the guest interaction to the environment, one scenario is the eventual depletion of natural resources, leading to the destruction of mankind. The other theory is to instill enough of faith in high technology to solve all environmental problems.¹³ The ecological design solution offers an proactive approach to design. Designing with an environmental balance restores ecosystems. As a result, architectural interventions do not have an adverse effect on the environment. All decisions today effect architectural design and planning for future for society.¹⁴

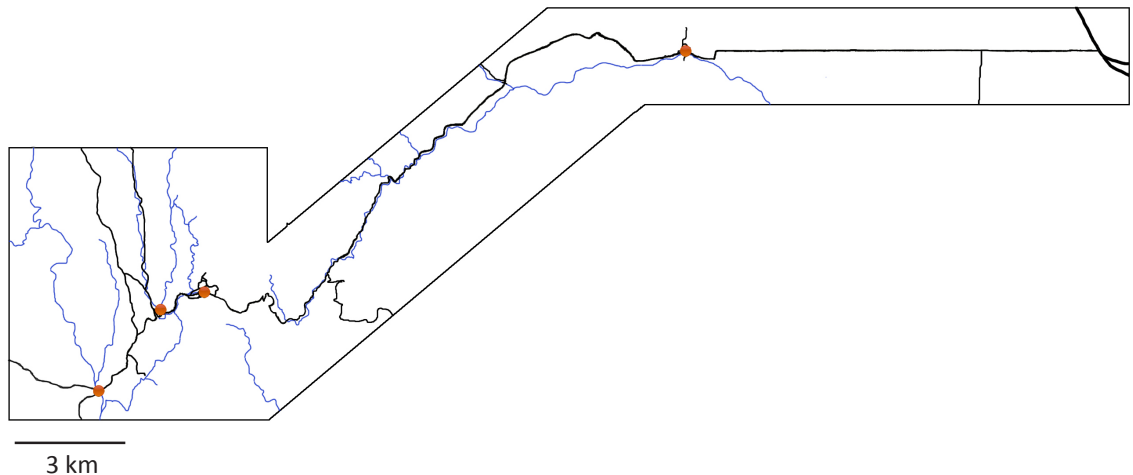
Due to the Cumbres de Majalca National Park's remote location and mission to preserve the natural environment, sustainability is a key aspect in the Ecolodge design. The word *sustainability* means the use of natural resources in a way that does not deplete or permanently damage the source. Common sustainable practices in the building industry include material selection and construction methods, energy harvesting and maintaining natural habitats. These aspects are further researched to better understand how they are be used in the design project. These building components strive to support the initiative to reduce the impact from the Ecolodge on the environment.

Sustainable building practices are a holistic methodology that understands all the external and internal influences including the dynamics between the two conditions which create the environmental impact. In order for a building to be truly sustainable it must have an ecological response, produce its own energy that it consumes, and maintain a comfort level in the interior spaces for users. Designing ecologically is difficult to understand the intricacies involved in reaching a balanced interaction between the built and natural.

Most of existing buildings in the park do not show evidence of incorporating biological or physical constitutes of the environment into the design. Continual neglect

13 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 1.

14 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 83.



[Figure 8] Park boundaries; highlighting roads, rivers and town locations within constraints

for addressing the natural ecology will immediately lead to displacement of essential parts of the ecosystem and in the future leave ecosystems in complete disrepair.¹⁵ It is fair to say that nothing in the world is untouched due to consequences to air and water pollution. However, the level of human interaction in an environment can demonstrate how much an area has been influenced. As a designer, careful considerations should be made in relation to ecosystems to optimize and conserve Earth's natural resources.

Boundaries

As an extension of the previous chapter on the physical characteristics, ecological factors in the built environment need to be balanced. Figure 8 illustrates the park's man made boundaries which are representative of the typical division of land that made of arbitrary boundaries and can be fenced off. However, in nature these physical boundaries do not exist, the interaction of a complex web of interdependencies extend past physical boundaries.¹⁶ Under man made boundaries, only adjacent environmental components like segments of rivers and land on the property are considered. This close minded mentality creates an imbalance in the ecological system. The environmental zones are divided into land, air, and water, each of which is made up of various biological components. The zones allow for interaction of plants, animals, soil, climate and human

15 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 11.

16 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 13.

interaction; they are a holistic view that penetrates any man-made boundaries. The extent of impact and any permanent damage to ecology varies on the geographic location of the site, as well as the interaction of people in the surrounding area.¹⁷

Natural environmental zones within the park can be created by boundaries between a microclimate ranging from 4,500 feet to 7,800 feet in elevation. However there are rivers that flow through each microclimate providing nutrients for plant and animal life. The Sacramento River which originates in Cumbres de Majalca continues past protected park boundaries till it intersects with the Chuviscar River before reaching Chihuahua, Chihuahua.¹⁸ Human interaction at any point in the river's natural path can cause a reaction which change the cleanliness, amount of water or change the rate in which the water filtrates into the water table below. The man made boundaries of the park only protect the surrounding areas along the dirt road connecting main highway to the heart of the national park and the adjacent areas around the small towns of Majalca, Soledad and Güerachi. The boundaries do not follow any major natural barrier. The man made road up to the center of the park follows a river bed for the most the way until it begins winding up the mountain side.¹⁹

The way rivers flow throughout the national park cause organic erosion of volcanic rock which creates unique canyons. Other rock formations in the park are created by wind erosion on volcanic rock formations. The rock formations can be a part of large mountains or free standing rocks help create visual and spatial boundaries between properties or even stand as important landmarks in the town. Natural boundaries of rivers, mountains, tree clusters and canyons can heavily influence where buildings can physically be built however the man made interventions and boundaries often ignore natural boundaries and extended ecosystems.

The environment is in a constant flux due to natural changes in the environment, such as seasonal monsoons and other unexpected occurrences. These natural

17 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 17.

18 Lesueur, Harde. "The Ecology of the Vegetation of Chihuahua, Mexico, North of Parallel Twenty-Eight." *The University of Texas Publication* 4521 (1945): 13.

19 Steele, *Ecological Architecture: A Critical History*, 30.

occurrences cause variation in ecosystems, which can be recovered; however, constant abuse like building without restoring the ecology leaves no hope for restoration in those sites. Majority of architectural interventions and human interaction are not designed with ecological considerations in mind.

Architecture & its Ecological Impacts

There are drastic differences between an architect and an ecologist's perspective on how to design with ecological considerations. Ecologists generally view built structures as a composition of living and nonliving components, much like everything else in the environment. Architects however, investigate the site's potential for enhancing the spatial experience. Components like circulation, views and building form are important to make the interior and exterior spaces comfortable to the users. Incorporating both perspectives into future projects would be extremely beneficial to the environment.

The built environment is an extension of the natural environment. As the building transitions to the natural environment, it must continue to interact with the biosphere in which it exists. Material selection is based on natural resources that are readily available for construction. The lower the embodied energy, all the energy needed to extract and process, transport and assemble a material or resource, the better it is in the long run.²⁰ The relationship between architecture and ecology can be a dynamic life system transformed into a built environment. The balance of energy production and consumption should be equally between built structures and the environment they exist in. A symbiotic relationship must be formed in order to survive ecologically.

A way to improve over all energy consumption through the life of a building is through climate responsive design. It is a holistic design approach that creates building forms which moderate the climate for human health and well-being. It is a challenging process in the sense that it consists of being able to select, integrate, and evaluate

20 Steele, *Ecological Architecture: A Critical History* , 7.

alternative design strategies, which are often competing and contradicting.²¹ The main goal of climate responsive design is to encourage responsible design practice that will minimize negative building impacts for inhabitants and the surrounding environment.

The life of a building is measured in its economic life and in its physical life. The economic life of the building is the time the built system produces enough income to justify the investment or occupancy. While the physical life of the built system is the period of time which remains in use in the built environment before it is assimilated and introduced into the ecosystem. The common perspective is based on economic security; however, an ecologist views the building through its materials lifespan. If the building is not designed for various uses over its natural life, then the building becomes inconvenient and inadequate, with the end resulting in demolition. Other reasons why the building may be demolished before reaching its physical life expectancy can be due to the location, function, technology and physical quality.²²

The responsibility of the designer is to consider the materials chosen and their life cycle. Buildings are potential waste products of the environment's precious resources. The current use of materials has been a linear flow with a onetime use and components discarded when finished. Ecologist are beginning to identify a cyclical pattern of use in building materials by calling designers to attention to take responsibility for the materials after the consumer is finished with its economic life span. Reusing, regenerating and recycling are all prospective ways to treat materials during demolition. Main structural components, like steel, will lose about 10% in each cycle and objects such as windows, doors and flooring have an opportunity to be used again.²³ However, there are also many products that only have a linear usage, such as paint, solvents, and cleaners.

The life cycle of a building consists of a production phase, construction phase, operational phase, and recovery phase. The hope is to bring the recovery of products

21 Richard Hyde, *Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates* (London; New York: E&FN Spon, 2000), 53.

22 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 131-132.

23 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 140.

back into the production of future items to continue regeneration of valuable materials. Ecological design must consider important aspects of the life cycle in the choice of products, such as being aware which could be reused after consumption. Quality materials will last long after their economic life span and should be reused until they meet their physical limitations.

Kenneth Yeang developed a framework for designers to use to incorporate ecology into their design. The core basis of the guide is to continually seek to minimize and be responsive to negative impacts on the environment's ecosystems and the natural resources it has to offer.²⁴ First, one must understand the context in which the building exists. The complex web of ecological systems in the region should be reviewed in an intellectual manner. The design should then reflect knowledge gained from such analysis. Then, a formal environmental impact statement should be documented, emphasizing the extent of human interaction in the region and the level of dependency of the users on the built and natural environment. There is a general perspective among designers that a built structure results in a loss of natural ecological systems. Humans cannot create or entirely replace the ecological space which they exist. Natural conditions can only be simulated, or partially recreated, to replace some loss. After the demands and influences are determined, the architect must trace potential materials and calculate their energy consumption to determine what is best for the building and the environment.²⁵

In short, the framework includes the following: designed system, environment of the system, and interactions between the designed system and its environment.²⁶ As a result of this framework, four sets of effects are produced - external relationships, internal relationship, inputs and outputs. The interrelationship between these four sets is what demonstrates the balance and appropriateness of ecosystems and its natural resources.

24 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 46.

25 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 75.

26 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 79.

Ecological Interdependencies

The external ecological dependency of the built environment is defined as the quality of natural resources and ecosystems. It is important that the designer quantify human demands and loads with the potential design to evaluate the impact it has on the external environment. The site analysis, later in this document, will include ecological descriptions by aerial mapping the region and measuring changes over time. There is a complex layering of elevation, soil, drainage, microclimate and vegetation will provide intricate interactions that make this location unique. Furthermore, the complex ecological change during each season creates another layer on top of physical interactions.²⁷

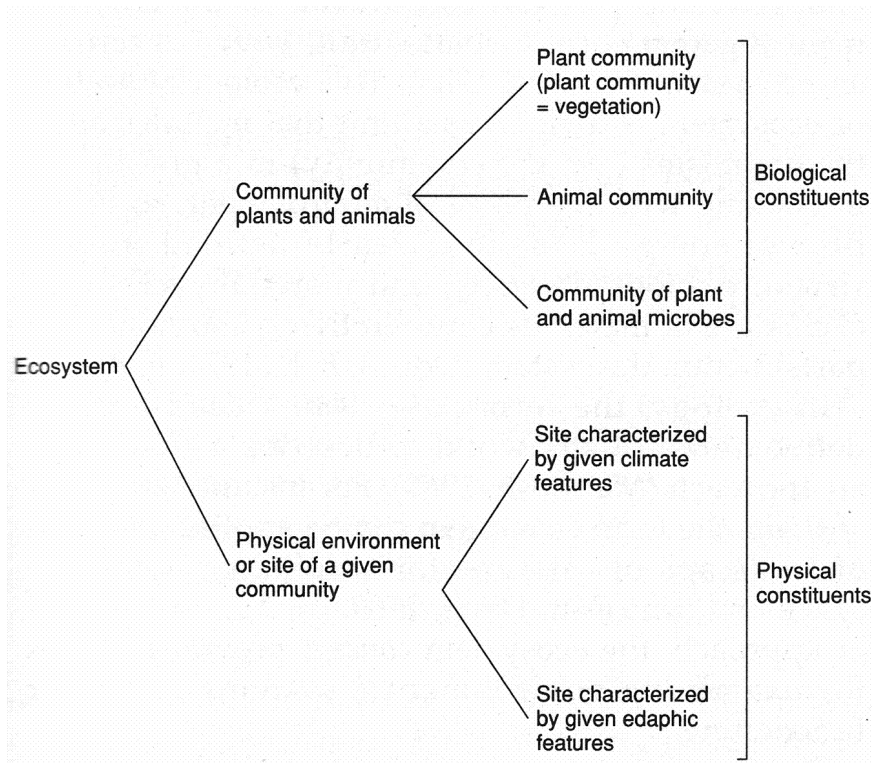
The built environment is dependent on natural resources and energy for existence. Some sources used for construction available in Cumbres de Majalca are forest products, rock and alternative energy sources like sun and wind. Sand and gravel are also readily available materials to mix with cement for construction. Sources of fresh water in the park come from rivers and groundwater. When choosing a building material, it is important to choose wisely based on which are readily available that do not further deplete the precious natural resources. There are inexhaustible materials such as air, water and solar energy that promote sustainable life.²⁸

Natural defenses are also important in the interdependency of the environment. In order to maintain cleanliness and a healthy balance, the environment creates certain elements, such as bacteria and fungi. When these components are abused and ignored, the environment will not be able to naturally cleanse itself and eventually lead to deterioration.

Figure 9 helps distinguish physical environmental conditions from biological components like plants and animals. Analyzing biological constitutes such as plant associations are an important component to responding architecturally to the environment. The preservation of local plants is consistent with the reason for

27 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 92.

28 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 100.



[Figure 9] Ecosystem divided into biological and physical components

preserving Cumbres de Majalca. The park has a unique setting between the Chihuahuan Desert region and the Western Sierra Madre which creates a dynamic range of vegetation. An article in *The Southwestern Naturalist* by Eduardo Estrada-Castillon carefully evaluates the vegetation types in Cumbres de Majalca National Park.

The differences in locality make dramatic changes to how the site will be treated. Though out the park the predominant rocks are volcanic in origin, large rock formations are examples of vulcanoclastic type of riolitic and basaltic composition. Generally there are two predominant plant communities in the area, grasslands and pine-oak forests. However more specifically the species and growth forms consist of 255 genera and 470 species though out the national park.²⁹ The lower portions of the park consist of 20% of the preservation area. The soil and rock conditions in this flat area are of sandy-clay, with depths up to 20 inches. This area can be categorized as a dry microclimate with high evaporation rates. Plants within this lower elevation consist of various small shrubs and

29 Estrada-Castillon, *Southwestern Naturalist*, June 2, 2003.

Bouteloua grass. The other 80% includes highlands like mountains, small intermountain valleys and cliffs. Midlevel soil conditions are colluvial soils, derived from igneous rock, 10 to 20 inches in depth. Plant life within the moist canyon spaces is rare or absent from other areas in the park. At the highest elevations of from 6,500 to 7,800 feet, the soil is developed in situ and partly colluvial with depths from 1 to 5 inches. The texture of the soil is a sandy-clay and sandy-loam with rock and gravel intermixed. There are many trees found at this elevation with the average height of 30 feet.³⁰ Many similar plant species in semiarid landscapes can be found in Arizona and New Mexico.

Through the last 40 years there have been signs of degradation in the grasslands and canyons with the largest conifers. Overgrazing of the area due to livestock and increasing human intervention has caused a shift in the original vegetation, invasive species are taking over in populous areas. It is important to implement management plans to ensure the preservation of significant diversity in the national park. The previous extent of human intervention contributes to the ecological restoration which needs to be taken in the future.

The ecological factors for Cumbres de Majalca National Park can be categorized as (1) species and populations, (2) habitats and communities, and (3) ecosystems processes.³¹ At all costs, decisions should be made to minimize the effects on the ecosystem. Permanent changes made on the site will influence the environments' ecosystem. If treated without consideration, there could be extreme physical alterations done to the environment. Planning solutions can help avoid destructive behavior by defining land use patterns through preserving conservation lands as buffer zones and controlling human interaction.

The internal ecological dependency of the built environment is defined as the external ecological impacts and interactions that result from the entire set of actions and the activities of the designed system during its life cycle. Impact on ecosystems is measured by the amount of energy and material inputs, the amount of energy and

30 Estrada-Castillon, Southwestern Naturalist, June 2, 2003.

31 Yeang, Designing with Nature: The Ecological Basis for Architectural Design, 107.

material outputs, as well as the influence of human actions and activities in the built environment. Built structures and their interaction to the natural world have to consider the lifetime of materials used in constructing the form.³²

Traditional Ecological Knowledge

The displacement of indigenous building typology in Mexico began with colonization. Spanish influence imposed their own culture and views onto native people, this causes a loss in a term called *traditional ecological knowledge*. Berkes defines the term as “cultural continuity transmitted in the form of social attitudes, beliefs, principles and conventions of behavior and practice derived from historical experience.”³³ Spanish Conquistadores imposed their western ideas on to local people, discouraging any traditional practices.

Spanish architecture impractically influenced in Mexico despite the different climatic conditions between Spain and Chihuahua, in Northern Mexico, has proved to be very consequential. Cutting the cycle from further detrimental repetition, the appreciation for environmentally adept examples from various vernacular models has become more popular.³⁴ The need for ecological design has evolved into a holistic approach of energy utilization, material considerations and resource management of architectural interventions. Buildings become a design system which creates its own life-cycle. This is in hopes that the extent of impact doesn't cause permanent degradation to the environment.

Steele looks at vernacular architecture north of the Tropic of Cancer and notes that homes are frequently constructed from stones, brick or adobe. The adobe process is a family craft passed through generations and often adobe makers will mix straw or manure in the mud to create greater elasticity after it has dried in the wooden frame.³⁵ Then the dry adobe is joined together with more mud and pebbles to reinforce walls

32 Yeang, *Designing with Nature: The Ecological Basis for Architectural Design*, 118.

33 Berkes, Fikret. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia, PA: Taylor & Francis, 1999.

34 Steele, *Ecological Architecture: A Critical History*, 31.

35 Yampolsky, *The Traditional Architecture of Mexico*, 57.

on top of the foundation. Rough plaster is then applied to protect against the elements and insects. Lime is the main natural ingredient used to create this finished exterior. Generations have perfected the art of adobe in Mexico however because of globalization technological advances produce fabricated models which are placed worldwide without site or cultural response.

It is important to reconsider how tribes in the mountains and valleys built with adobe and how the spatial organization often opened rooms to an interior patio space for gathering. In regions where trees grow it is common to see wooden homes with large beams spanning the home or as the foundation to allow for easy disassembly and reconstruction on another site.³⁶ Another popular finishing in temperate zone are terracotta roof-tiles which create a watertight shield from the elements and have a much longer life span than a thatched roof.

36 Yampolsky, *The Traditional Architecture of Mexico*, 58.

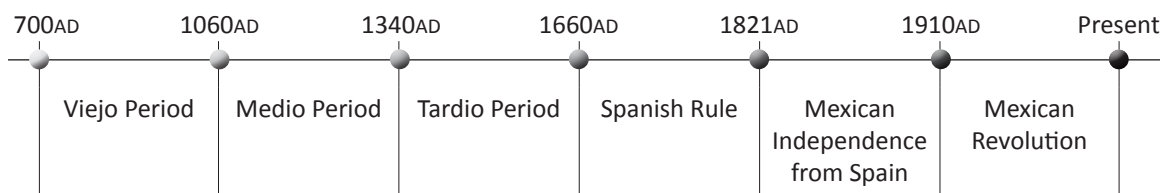
Chapter Three

CULTURAL BACKGROUND

Traditional ecological knowledge is not only limited to sustainable qualities it also gives incite to a cultural aspects. Investigating civilizations from indigenous people in Chihuahua reveals qualities that share how they lived and interacted with one another. Understanding the dynamics that influence the region dictates how buildings, customs and social interaction are different that everywhere else in the world. The unique condition about Chihuahua is there are similarities are found between the southwest United States and Aztec communities in Central Mexico. Centuries of cultural influence illustrated in the time line chart 1, from the Viejo Period to the present have created unique people and customs in Chihuahua. Understanding and implementing these cultural dynamics creates for an authentic visit to Cumbres de Majalca Ecolodge.

Timeline

Cultural heritage in Chihuahua can be traced furthest back 700 AD, a period characterized by small agricultural villages. Ceramics during this period was simple, only red pigment found painted on top of brown clay is representative the Viejo period. Architecture during this time was circular pit houses where many families stayed in the same space with wattle and daub surfaces. These circular pit houses, photographed in figure 10, ranged from 25 feet to 135 feet diameter. In larger pit structures there would be interior pits that would divide the space further often with interior post hold which dictates interior walls. The adobe hearth in the building was set off center to the east for religious reasons as well as protection from drafts coming in from the main opening. These pit structures can influential in understanding the community in Majalca. Just as



[Chart 1] Time line of Mexican History



[Figure 10] Pit house from Anasazi community in Utah

one pit house would be subdivided among extended family, property in the national park has sub divided among family members due to all existing lots were purchased before the area became a national park. One lot of land may have one home or four homes on the property however the original home continues to be the center of traffic and meeting point for the whole family.

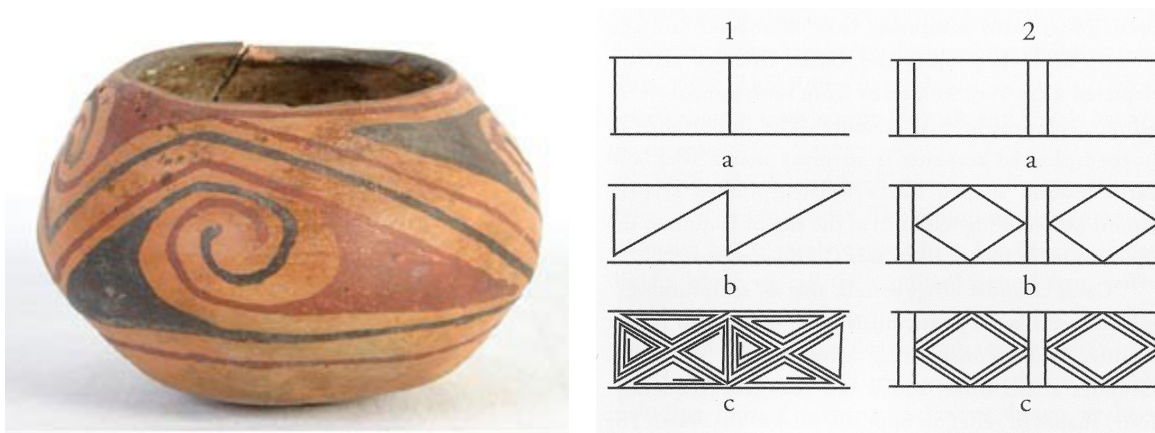
The demarcation of the Medio period is defined by more color pigments and the communities become substantial towns or villages with pueblo adobe homes beginning after 1100 AD. The social stratification in was very important the community as well as extent of interaction with external regions, archeologist have discovered artifacts such as shells from Baja de California and copper or turquoise from southwest United States can be found in these communities showing a network of trade and quantifiable exchanges. Following the medio period is the tardio which extends till 1660 when the Spanish influence clearly takes control until 1821.³⁷

37 Stewart, Kelley, MacWilliams and Reimer, "The Viejo Period of Chihuahua Culture in Northwest Mexico." 169-192.

Archeology at Casas Grandes

The best archeological representation of a past civilization in Chihuahua is Casas Grandes from the tardio period. Unfortunately this site is not documented as well as those in the southwest United States or in Central Mexico communities like Aztecs, Mayan and Olmec people. Casas Grandes is located in northwest Chihuahua shares similar building materials and ceramics to native settlements in southwest United States; Arizona, southern Colorado, New Mexico and Texas. Ceramics found at Casas Grandes are very similar those found around the Mogollon Area that extends along the border of Sonora, Arizona and New Mexico. Ruins during the Viejo period are found in small communities of people and seem nearly empty till 1200 AD. Due to the lack of documentation done in Chihuahua compared to those in the United States, many researchers have made forged conclusions by comparing Chihuahua to the better studied sites in the southwest.³⁸

Ceramics like in figure 11 were found at the Casas Grandes are derived from geometric patterns primarily divided into two triangles or diamonds and then designed further into intricate black lined designs.³⁹ The geometric pattern is symbol of duality and marked the civilization's mathematical knowledge and sophistication. The designs



[Figure 11] Ceramics designs from Casas Grandes

38 Whalen and Minnis, "The Local and the Distant in the Origins of Casas Grandes, Chihuahua, Mexico." 314-332.

39 Stuhr, Joanne, and Eduardo Carrera. Talking birds, plumed serpents and painted women: the ceramics of Casas Grandes = Pajaros hablando, serpientes emplumadas y mujeres pintadas: la ceramica de Casas Grandes. Tucson, AZ: Tucson Museum of Art., 2002.

sought balance between the two sides and was symbolically important for both halves to thrive.

Based on Casas Grandes' location it seems inevitable to be influenced by both southwest and Mesoamerican cultures. The chorology of Pre-Columbian history show a large settlement in Chaco Canyon in northwest New Mexico was one of the first Puebla civilizations that dominated the region at its time. The next significant denotation would be the Aztec civilization which shared its cultural significance with other Mesoamerican civilizations. Following the Aztecs chronologically is Casas Grandes with many similar traits to Chaco Canyon.⁴⁰ The Casas Grandes settlement is located on the largest river in Chihuahua, also called Casas Grandes, which provided a constant water source for irrigation. The soil and climate also aided in creating an ideal location for agriculture. Geographically Casas Grandes is along an important north to south corridor on the eastern foot of the Sierra Madre.

The importance of this location is similar to Cumbres de Majalca. Although the national park is situated along a much smaller river system, it too lies in the same transition region between the Chihuahuan desert and Sierra Madre Occidental. Sharing the same moderate climate that can be traveled to at all times of the year without extreme climate fluctuation. A permanent settlement would be more than suitable for people, plants, and animal life. Since the park is protected the transition for Cumbres de Majalca is from urban city to rural getaway. When traveling away from the main city of Chihuahua, the city fades in the distance along the major freeway. The exit for the park has no major distinction other than a rest stop and gas stations, the journey continues along the dirt road, becoming curvier along the way. The time it takes to reach the summit, allows the visitor a chance to leave the large city behind and become emerged in the beauty of the park. The temperature drops from the low land deserts and trees begin to become denser.

The transition and approach are very important to how the summit is perceived.

40 Whalen and Minnis, "The Local and the Distant in the Origins of Casas Grandes, Chihuahua, Mexico." 314-332.

If it were a large paved road, the buildings would respond to that context. However the narrow dirt road calls for a more attentive design for the surrounding landscape. The responsibility and respect for the rock formations, the river, plants and wildlife are all silently addressed with contextual clues like materiality in existing structures and reforestation throughout the park.

Cultural Incite

The social stratification in the Casas Grandes community is much more similar to Mesoamerica than to southwestern states. This conclusion is based on ceramics found at Casas Grandes which depict Shamani journeys through smoking, males kneeling, dancing birds, serpents, and other ceremonial activities. Horned or Macaw people depict the journey to the spirit world.⁴¹ Similar to worldwide shaman practices, they are leaders who have a gift to journey from the physical world into the spiritual world. Their journeys can range from healing, weather manipulation, and divination, ensuring successful hunts, finding lost objects, self-empowerment, killing enemies, fertility or fecundity for benefit of their people.⁴² Shaman hold an important leadership role in the community and tend to be the political leaders while priests only hold part time duties only related to religious practice.⁴³

The Shaman journey is symbolic in understanding their fundamental goal of reaching spirituality. This journey is achieved only by those who have the gift to communicate beyond the human world. There is a process that encompasses rituals, like chanting or smoking to get the Shaman in the state of mind that is able to communicate beyond our world. The journey into the park symbolizes the ritual or path one has to take to reach the summit. In the past the journey was a longer and anticipation increased as men road horses and camped along the increasing elevations. Today the dirt road maintains characteristics that travelers cannot ignore. The bumpy, curvy and narrow road is in preparation for the beauty at the summit. Those who are willing to

41 VanPool, "Shaman-Priests of Casas Grandes Region, Chihuahua, Mexico." 696-717.

42 VanPool, "Shaman-Priests of Casas Grandes Region, Chihuahua, Mexico." 696-717.

43 Rankita, "Social Complexity, Religious Organization and Mortuary Rituals in Casas Grandes Region of Chihuahua, Mexico" 293-295

make the journey and appreciate the rustic character, in which they are submersed, will find the experience spiritual. Feeling an undeniable connection to the environment and awestruck by the large rock formations that look as if they are connected to one another by a toothpick.

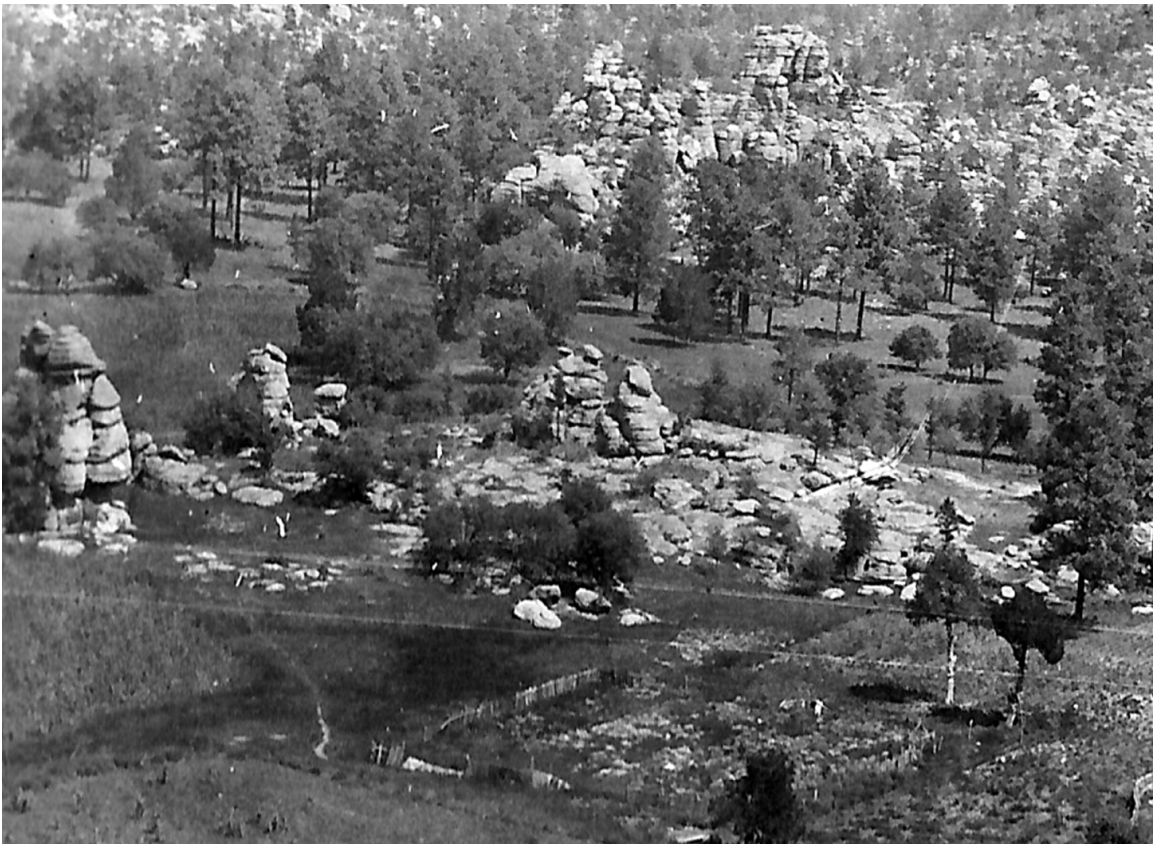
The reason the park has stayed primarily sheltered is the exclusive social stratification created in the community at Cumbres de Majalca. The founding families who could afford a car in the 1920's were also the people who bought land. They represent political power, wealth and ability to influence change, their role is similar to the Shaman's leadership in indigenous Chihuahuan culture. The elite community is defined by its past and continues to stay true due to limited properties that are available within the park constraints. Generations of families who continue to pass down the land and teach future generations the importance of the land, water and animal life.

Chapter Four

HISTORY OF CUMBRES DE MAJALCA

To better understand Majalca one must fully understand the evolution between the initial settlement and current conditions. Visitors seemed to spread knowledge of Majalca by word of mouth amongst friends in colleague in the city of Chihuahua. The people who are interested in visiting have a similar appreciation for the park, the active lifestyle that it represents and the rust accommodations. Coming to Majalca one expects hiking, camping, rock climbing, river adventures, horseback riding and anything and everything unexpected to happen. This is what creates the essence of Majalca and forges deep ties between the people who experience the adventures together.

The summits of Majalca were rediscovered by men who went exploring in the mountains around Chihuahua in the early 20th century. On horseback they discovered new sites, where they would camp over night and continue on to new places the next



[Figure 12] 1930: Cumbres de Majalca

day. When they came upon what would become Cumbres de Majalca, the clear valley with surrounding mountains and rock formations, shown in figure 12, they were blown away by the beauty of the area. The years to follow these men shared the place with others who were willing to take the long journey to reach such a site.⁴⁴ It took a particular type of person to be willing to venture into the mountains with only a horse and backpack and camp.

It wasn't till three years of constant visits that any permanent structure was built.⁴⁵ When a small one room adobe house arose, it offered accommodations to visitors who were not willing to sleep outdoors. With a permanent structure more people were willing to make the journey. The location of the summit was ideal with its flat plain and nearby springs. However, the only proof found of previous settlement was a rock painting of seven human figures with dots in red pigment and some tools that indicate human activity. Quickly vandalism became an inherent problem and particular places like 'el peñon', a large rock formation, which was deemed an archaeological site by Francisco Mendiola.⁴⁶ Artifacts were collected and have gradually been lost throughout the years.

By 1925, some of the explorers had claimed land and marked their property with fences or simplistic shelters. The founding families took pride in the land and wanted to carefully document land lots, depicted in figure 13, that were purchased from the state to ensure their ownership. It wasn't till March of 1928 that construction of the first road began, lasting over nine months.⁴⁷ The road was financed by some of these early settlers who also were political leaders and elite in Chihuahua. This made it much easier for the whole family to go on the adventuresome trip. Trucks loaded to the top with camping supplies allowed for greater conveniences during their stay. The only time the road became nearly impossible to travel is during the monsoon season from late July

44 Saldivar, Queenie. Interview by author. Phone and e-mail interview. Between Honolulu & Majalca, March 10, 2011.

45 Uranga, Luis Alfredo Lopez . *Majalca de mis Recuerdos*. Chihuahua: Mexico, 2010.

46 Uranga, Luis Alfredo Lopez . *Majalca de mis Recuerdos*. Chihuahua: Mexico, 2010.

47 Uranga, Luis Alfredo Lopez . *Majalca de mis Recuerdos*. Chihuahua: Mexico, 2010.



[Figure 14] 1934: Cooling off the radiator

through September because the road closely followed the river bed up the mountain. Although the road provided for much easier travel of people and supplies, cars were not specifically equipped for such rough terrain at this time. During the journey up the mountain, vehicles would have to stop many times to allow the radiator to cool before continuing any further, as seen in figure 14. About half way through the journey up the mountain the car would have to stop at a well called 'chorrito' where people could get water to cool the radiator and rest before continuing on.⁴⁸

Inspired by stories brought back from trips, more people in Chihuahua who were able to drive up the hill made the journey to see this scenic landscape. Slowly rustic homes began to pop up, taking four or five years to build because of transport of supplies like windows and doors took much time and labor from Chihuahua. By 1933, there were fifteen homes built in the summit, one of which depicted in figure 15, and each family who lived here had respect for one another and land that surrounded them. During this time Roberto 'Che' Saldivar and his wife Queenie Louise Stephanie Coates de Saldivar had made their first visit where she fell in love with a specific property called 'El Nido de Aguila', the eagle's nest, figure 16. The lot was named after its close relationship to the

48 Saldivar, Queenie. Interview by author. Phone and e-mail interview. Between Honolulu & Majalca, March 10, 2011.



[Figure 15] 1927: Saldivar House



[Figure 16] 1927: Nido de Aguila

wind shaped rocks and pine trees. They soon bought the land and created a home where she lived all year long while her children were very young.⁴⁹

The importance of the park and the people who had made it their part and full time homes pushed for Cumbres de Majalca became a National Park on September 1, 1939. The park includes nearly 12,000 acres of land with protected flora and fauna.⁵⁰ The purpose of protecting the land is to help preserve natural habitat for many species of plants and animals. When it became a National Park, efforts in reforestation of coniferous species began however the properties that had already been mapped out in lots were grandfathered into the park constraints. The continued growth in these grandfathered areas is permitted as long as no further deforestation continues as a result of new construction. Materials for construction would need to be brought up from Chihuahua or surrounding areas to ensure that the national park maintains its existing ecological stability.⁵¹

Over the years Majalca has maintained its rustic appeal and has many visitors every year, there are even annual mountain biking races held that bring thousands of

49 Saldivar, Queenie. Interview by author. Phone and e-mail interview. Between Honolulu & Majalca, March 10, 2011.

50 Estrada-Castillon, Juarado and Navar, "Plant Associations of Cumbres de Majalca National Park, Chihuahua, Mexico." 177-187.

51 Saldivar, Queenie. Interview by author. Phone and e-mail interview. Between Honolulu & Majalca, March 10, 2011.

people to the park to participate and watch as bikers force the dirt roads throughout the park. It has become well known in the city of Chihuahua and the surrounding states in Mexico for adventure tourism. Even with the increase of visitors, the building foot prints have kept with a steady growth pattern over the last century. Although there is no more land to buy, home owners are dividing their lots between family and friends to build their own homes to enjoy.

Many families are just starting the fifth generation of children who are experiencing the same adventure, curiosity and freedom that the park represents. Family and friends sit and pass down stories of past adventures from their generation around the fire at night. There is a distinctive human element in Majalca where everyone is brought to the same level, the differences between families in the city of Chihuahua are put aside to commonly enjoy the beauty of their surroundings. The cultural appreciation for the environment and adventure is a common thread between all who experience Majalca.

Chapter Five

POLICY

The best solution to protecting Cumbres de Majalca is by following laws and procedures from federal, state and municipal organizations. Because Cumbres de Majalca is a national forest, the process will probably tightly follow state protocol for maintenance, reforestation and all projects not on private property. Issues within the community the more difficult are left to community organizations to solve civil problems like property lines, livestock grazing and private projects. A combination of strong policy and community action is the best way to secure rights to the land and maintain an ecological balance in the park.

During the 1970's, Mexico began making first efforts in creating an organization to attempt to protect the environment. Federal Law for Prevention and Control of Environmental Pollution was the first organization to be established. Their primary concerns were for public health, addressing air quality conditions. Regulations for dust and smoke were implemented in attempt to clean up atmospheric pollution. Other attempts made effort at water quality conditions to better preserve wildlife in the surrounding water that provided food and tourism for the country. With every change in office brought different priorities for the president so in 1987 the powers were shifted to state authority to enact laws and promote the participation of federal, state and local authorities in environmental matters. This change allowed for specification of laws based on specifications of the state such as climate, geography and level of human interaction with in its constraints.⁵²

General Law of Ecological Equilibrium and Environmental Protection, LGEEPA, was Mexico's first comprehensive environmental law. Their interaction covered many more environmental conditions than air and water quality. LGEEPA addresses protection of natural areas, exploitation of natural elements, hazardous waste disposal, contaminations issues and other forms of pollution. They are also in charge of the safety

52 Chihuahua State Government. "Ministry of Trade and Tourism Development." Chihuahua State Government Portal. <http://www.chihuahua.gob.mx/turismoweb/> (accessed March 23, 2011).

measures, penalties for not complying, create guidelines for environmental impact statements and risk assessment.⁵³

Secretariat of the Environment, Natural Resources and Fisheries, SEMARNAP, became an amendment to LGEEPA to promote sustainable development. The set of principles are confronting the challenge of designing responsibly so that buildings of today are not taking anything away from the future. Their main balance as an organization is to weigh sustainability as a biophysical entity and from a socioeconomic point of view. By analyzing their work on past projects, Cumbres de Majalca could be wildlife and nature preserve that guides tourist groups through to learn about the unique aspects of the National Park and how important it is to keep protected. When there is a place or destination for tourists to visit, it also means an income of money. To secure the continuation of visitors and income, roads and other public facilities are improved. SEMARNAP though extensive studies would analyze the changing number of visitors and begin to weigh the impact of the increased number on the environment.⁵⁴

If the amount of visitors is unregulated the preserve the ecosystems absorb the impact. Natural resources and wild life found in the preserve are threatened by taking unlimited number of vehicles and tourists into the area and stripping the vegetation. If the preserve is completely destroyed, the economic benefits of the tourist activities realized by the local residents will not last. The area cannot be considered as one that is being developed in a sustainable manner because the activity produces only a temporary financial reward on exploiting the parks beauty.⁵⁵

Government actions to protect the park without considering the economic needs of permanent residents of Majalca will only worsen their employment opportunities.

A solution would be sustainable development, the government could offer incentives

53 Federal Government. "National Tourism Department." Secretary of Tourism. www.sectur.gob.mx/wb/secturing/sect_2_home (accessed March 7, 2011).

54 Magazine, Alan H.. Environmental Management in Local Government: A Study of Local Response to Federal Mandate (Praeger Special Studies in U.S. Economic, Social, and Political Issues). Westport, CT: Praeger Publishers, 1977.

55 Zetter, Roger(Editor). Designing Sustainable Cities in the Developing World. Abingdon, Oxon, , GBR: Ashgate Publishing Group, 2006. <http://site.ebrary.com.eres.library.manoa.hawaii.edu/lib/uhmanoa/Doc?id=10211406>

like alternative economic activities for the residents that would also improve the park conditions. The park is nationally protected which creates the dynamic chain of identifying responsibility on particular conditions.

Current federal interaction in the park has contributed limited community service projects by the military, who help reforestation by planting trees throughout the park. Their contribution helps restore areas that have been pilfered by the residents for their homes or to build stables for livestock. Other projects that have been completed by the government is a community hall that is used for special events. There is playground equipment like a slide, swings and seesaws for the community to use. The newest construction has been a small soccer court. There are three foot walls sound the sides of the concrete court and taller walls at the end goals to prevent the ball from traveling outside the court.

Maintenance of the park keeps most the focus for improving the road by making a solid surface to drive across rivers or fixing washed out areas of the dirt road. With current turmoil in northern Mexico due to drug wars, police action has focused greatly on stopping kidnappings and murders. This has left the common thieves and trouble unregulated, because of recent car thief along the road there is a daily escort for guests to and from the park to protect them from being run off the road.

Chapter Six

TOURISM

Tourism in the state of Chihuahua varies from archeological ruins to fashionable night life. However, Chihuahua is best known for its scenery. Various natural characteristics such as mountains, canyons, deserts, lake and fresh lakes draw visitors into adventure tourism. The state is full of hiking, rock climbing, river kayaking, sand boarding, mountain biking and various other outdoor activities. There are such diverse landscapes that fulfill any adventurer's spirit. The Secretary of Tourism estimates 757.6 million pesos were spent on formal ecotourism and adventure tourism in 2001, 64.2 percent by foreign tourists.⁵⁶

Surrounding Sites

Archeological zones such as Casas Grandes in figure 17, represents the rich ancestry of pre-historic culture. This northwest region represents the most important



[Figure 17] Casas Grandes

56 Federal Government. "National Tourism Department." Secretary of Tourism. www.sectur.gob.mx/wb/secturing/sect_2_home (accessed March 7, 2011).



[18] Copper Canyon

archeological site in Chihuahua. The homes at Paquime were circular pit homes built from sundried blocks and plastered inside and out. The largest structure of the city was 800feet by 250feet in a rectangular shape. Astonishingly buildings stood up to 50 feet tall which held six or seven stories. Their remains show a high degree of civilization through its multiple story buildings, Ceremonial precincts, efficient hydraulic networks, plazas and social centers; concluding it was an urban city built by culturally developed people. UNESCO named this archeological site World Heritage in 1998. Another archeological site is Cuarenta Casas located south of Casas Grandes, just northwest of Cumbres de Majalca.

Indigenous people built into caves and show similarities to Casas Grandes and those of neighboring state of Sonora. Both sites give incite to the indigenous lifestyle and provide an opportunity for visitors to learn about Chihuahua's native culture.⁵⁷

Copper Canyon, in figure 18, is located south of the capital city of Chihuahua and is known for its more extensive canyon system and further depths than the Grand

57 Whalen and Minnis, "The Local and the Distant in the Origin of Casas Grandes, Chihuahua, Mexico." 314-332



[Figure 19] Polvorillas

Canyon in Arizona. People visit from all over to site see, hike, bike, and horseback ride though the canyon. Tourist can even take a train along the main part of the canyon to capture various viewpoints. Copper Canyon is one of six main branches of the canyon system. Another branch includes Basaeachi Waterfall that freefalls over 800 feet, the tallest waterfall in Mexico. The area is a haven for those who enjoy the outdoors due to the dynamic landscape, abundant pine and oak forests and rich wildlife.⁵⁸

Polvorillas, figure 19, is one of the most impressive landscapes of Chihuahua Desert, which further north becomes Arizona's desert, is full of whimsical rock formations known as stacked stones, creating one of Mexico's most unique landmarks. This rocky labyrinth amidst the desert is a breath taking site to visit for any adventure seeking tourist. The Chihuahuan desert is full of dynamic sites such as the Samalayuca Dunes. The fine sands continually move with the patterns and strength of the wind creating an ever changing landscape. Many extreme sports such as sand boarding, dune buggies, and other off road vehicles are common to the area.⁵⁹

58 Chihuahua State Government. "Ministry of Trade and Tourism Development." Chihuahua State Government Portal. <http://www.chihuahua.gob.mx/turismoweb/>

59 Chihuahua State Government. "Ministry of Trade and Tourism Development." Chihuahua State Government Portal. <http://www.chihuahua.gob.mx/turismoweb/>



[Figure 20] ATV Explorations



[Figure 21] Mountain Bike Race

As adventures who are traveling throughout Chihuahua would be pleasantly surprised to come upon Majalca. The park is far less visited than other tourist sites and has various physical components found in the desert and mountains. Similar to Polvorillas, rocks in the national park are also dynamically stacked into unbelievable formations. However unlike Polvorillas, Majalca also has plunging canyons that have beautiful striations like Copper Canyon. At the highest elevations in Majalca the vegetation is similar to Copper Canyon with forests of pine and oak. These contributing factors make Majalca a desired destination for adventure seekers. Unlike the other sites that are densely populated by tourist, Majalca is less populated due to its secluded location accessible only by long dirt road. Its location is also every appealing to residents of the capital city of Chihuahua because much closer than the other sites. This even makes it easy to even make a trip out of the city for the day.

Adventure Tourism

Adventure seekers have opportunity for the most extreme sports like motocross, all terrain quads, rock climbing and horseback riding, depicted in figure 20-23. Dirt roads extend in all directions far beyond the national park boundaries and lead to unique viewpoints or to hiking trail heads. Here the adventure continues by rock climbing, swimming, and hiking through canyons, to waterfalls or viewpoints that extend hundreds of miles out. For the guests who are unfamiliar with the intricate web of dirt roads and where they can lead, they may choose to set up camp in Majalca to enjoy the fresh air and outdoors. At night building a camp fire that cooks dinner and provides

warmth from chilly nights. On a clear night sky the stars and moon can provide light for pathways or an opportunity to count falling stars.

The range of adventure depends of the desire of the visitor. Many of the property owners in Majalca do not live there year round. The homes and livestock are maintained by permanent residents however the families generally live, work and study in the capital city of Chihuahua. There are families who spend their whole summers living in their homes in Majalca, others can only come periodically throughout the year on weekends. Due to the economic gap between rich and poor in Mexico, the families who traditionally could afford to build a home in such a remote location were very wealthy; whether acquired through government affiliation, business earned, or through undisclosed assets. There are properties that have been passed down through generations and are representative of the very narrow margin of middle class.

The accommodations at these second homes are very comfortable especially in comparison to the rustic surroundings. Water is brought into the house via a cistern that is filled through a pumped water from a well or the nearby river. Cisterns with river water often need annual cleaning to ensure tar build up does not enter the pipes or faucets. The water pipes in the home provide water for showering, flushing toilets and washing in the kitchen and bathroom sinks. The luxury of a private shower is necessary for many guests who visit. Traditionally electricity was run off generators that would not last throughout the night. More homes have recently looked into renewable energies like solar to provide power. However on cloudy days when electricity is not produced or the generator powers down owners resort to the traditional candle light or flashlight to navigate through the house or make fires outside in the courtyard space. Other demands for electricity include ice boxes or refrigerators keep food cool until ready to use, recently some homes have acquired washing machines. Appliances such as blow dryers and hot irons are exhausting on any electrical source, most often these commodities take too much energy to operate. All homes are passively heated and cooled there are no mechanical systems that monitor the temperature and humidity levels.



[Figure 22] Horseback ridding

The building program of the main house is primarily a master bedroom and one or two secondary bedrooms with bunk beds, two and three levels high, a kitchen, dining, and living room space. The spaces most frequently used are the adjacent outdoor spaces like verandas and courtyard spaces. The maid's quarters are located nearby and provide sleeping quarters, bathroom and small kitchen. Often they are full time residents and watch the property year round. If the owner has livestock, he may have larger maid's quarters that accommodate the whole family so the man and wife take care of the property and animals together. These caretakers and other permanent residents have a tiny population of 157 people between three towns in the park. In the surrounding area there are nine settlements that have 261 residents.⁶⁰ Depending on how many times the property has been divided among family members or sold to other families dictate the amount of land available around the home.

These seasonal residences create a new layer to the how population fluctuates throughout the year. Many of the seasonal residences are frequent visitors however the guests they bring with them do not have the same knowledge of the surrounding areas and tend to treat the park with a different respect. As of now there is no regulation on

60 "Cumbres de Majalca." RedEscolar - Portal Educativo. http://redescolar.ilce.edu.mx/redescolar/publicaciones/publi_prodigios/cumbre_maja/majalca.htm (accessed April 23, 2011).



[Figure 23] Camping Excursion

the amount of campers allowed in park at one time. Other camping zones in Chihuahua have fees from 15 pesos to 50 pesos per person and have services ranging from public bathrooms, showers, grills, and picnic tables. In the case of Rancho la Estancia, accommodations for four people can be made in a rustic cabin for a fee of 300 pesos a car.⁶¹ Fees for visiting camping sites are important to keep maintenance on park equipment and preserving the natural environment. The process it takes to get a permit helps to ensure that campers are accepting a responsibility to clean up after their site.

61 Chihuahua State Government. "Ministry of Trade and Tourism Development." Chihuahua State Government Portal. <http://www.chihuahua.gob.mx/turismoweb/>

Chapter Seven

PERCEPTION ON TOURIST DESTINATIONS

Tourism Feedback

During the Alternative Experience portion of the Doctoral Program, a firm in Mexico was selected to give further insight to the country in which the Doctoral Project resides. The architectural practice portion at TEN Arquitectos has given valuable insight to how architecture projects are designed and managed in Mexico. The firm tries to change the common worldwide perception of Mexican architecture by producing international projects with an Mexican essence far more sensitive to its culture. The experience itself has provided a cultural immersion into the Spanish language, food, travel, culture and customs. Experiential knowledge is key in understanding domestic tourism in Mexico.

The focus is to extrapolate information gathered from people living in Mexico City to provide a diverse pool of information about their tourism habits and desires. Five people were casually interviewed from four particularly defined groups to provide information about their travel practices in Mexico. Some key questions asked during the interview that aided in further research included:

How far are you willing to travel by vehicle for a few days away from the city?

What destinations do you plan/recommend visiting? Why?

What type of transportation do you generally use in reaching your destination?

Have you heard of adventure or ecotourism?

Would you be interested in staying in an ecolodge during a vacation?

The information gathered from these interviews was interpreted and particular aspects were further researched to better understand how people, places and tourist trends that are currently evolving in Mexico. For example, interviewee information on desired destinations was compiled and interpreted to reflect the four categories of tourism that the government is currently funding. By comparing the information between the interviewees and research, conclusions can be made about the future of tourism and the

viability of an ecolodge in Cumbres de Majalca.

Types of Interviewees

The goal is to interview various types of people to obtain a better understanding of how vacations are viewed in Mexico. These vacations can vary from a weekend getaway or a weeklong holiday trip, the purpose is to get a holistic idea of how each defined group below imagines their time away from the bustling city. Many examples of vacation destinations are recommended by the interviewers to help explain the types of destinations they enjoy visiting.

Short Term Foreign Tourists- Tourism is one of the county's leading economic forces bringing 22,395 million people into the country and that earnings 11,872 million dollars.⁶² This group of people can be defined as being Non-Mexican citizens who are temporarily in Mexico for a few weeks at a time. During their stay, from the people interviewed, is to explore Mexico City and possibly one other region of Mexico during the duration of their trip. This type of tourist generally has made plans for their time here, with specific sites they wish to visit. Generally they stick to the plans they have made previous to arriving unless they are in contact with a friend who is living in Mexico or relative who has taken some responsibility in showing them around.

Long Term Foreign Residents- As of 2010, INEGI accounts for 961,121 foreign residents were documented as living in Mexico.⁶³ This category of interviewees are people who are living in Mexico beyond the tourism permitted visa who have the opportunity to see more than the metropolitan area of the city. The duration of their stay provides an opportunity to see sites within Mexico City as well as destinations outside the city that are worthy of visiting during their stay. This particular type of tourists are more active in exploring what the country has to offer. The selection of interviewees in this category span from students to practicing professionals with

62 "Facts & Figures." UNWTO. Version 2011 Edition. UNWTO Publications Department, n.d. Web. 13 Nov. 2011. <<http://www.unwto.org/facts/menu.html>>.

63 "Conociendo... nos todos." INEGI. Version Volume1, Number 2 . INEGI, n.d. Web. 2 Nov. 2011. <www.inegi.org.mx/inegi/contenidos/espanol/prensa/contenidos/Articulos/sociodemograficas/nacidosenotropais.pdf>.

various spans of time they have committed to stay in Mexico. Persons who reside in the same location for more than 180 days would no longer be categorized as a tourist and would become familiar with particular places, customs and general knowledge of the area. United States citizens account for 76% of the total foreign population living in Mexico. Guatemala, Spain and Colombia are next highest concentrations of foreigners.⁶⁴ Immigration from Spain to Mexico is exponentially growing due to the current economic crisis in Europe, lack of employment and the familiarity of language between the two countries which makes the transition easier.

The Metropolitan area of Mexico City has 22 million of the 112,336,538 total people in Mexico.⁶⁵ As the main urban center there are millions of people migrating to the city center for jobs. This occurrence makes for a diverse compilation of people from all over the country. Their origins influence the way they view the city and vacationing. Other states tend to have more influence on adventure, ecotourism and alternative tourism.

Mexicans from Neighboring States- A category defined as native Mexican residents who are not from the particular city they are currently living. In this category of interviewees are generally thought to have family outside of the city who they continue to visit. Since family is an important aspect in Mexican culture, they are usually obligated to spend time with the family during free time or for holidays. These residents are more likely to take journeys outside the city to see their family throughout the year. They probably have a greater knowledge of the surrounding region than some people who are from Mexico City.

Mexicans from District Federal -The last defining group of interviewed people from are those who were born and raised in Mexico City. Their input is very important to understand how often the majority of people from Mexico City leave the city, when their

64 "Conociendo... nos todos." INEGI. Version Volume1, Number 2 . INEGI, n.d. Web. 2 Nov. 2011. <www.inegi.org.mx/inegi/contenidos/espanol/prensa/contenidos/Articulos/sociodemograficas/nacidosenotropais.pdf>.

65 "The World Factbook." Central Intelligence Agency. United States of America, n.d. Web. 18 Nov. 2011. <<https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html>>.

family, job and life are all in the city. This group is potentially the best guides for all the other groups because they can share incite learned through their entire life experiences. Their lives have revolved around the urban center and probably have less experience with the outdoors than people from neighboring states.

A variety of people for the interviews promotes a better perception of various groups view on visiting places outside Mexico City. Their input on what they expect from a vacation is important to implement into my design project. The information gathered from the interviews will help define the type of person who will be interested in visiting Cumbres de Majalca. The feedback received from the people in Mexico City will give a gage in the distance they are willing to travel for the amenities they expect out of a vacation and the activities they wish to participate in while they are there. Gathering vital information from various demographics will give me a better idea of how to market to people who would want to stay in the Ecolodge in Chihuahua.

The distinctive benefits of interviewing various types of tourists and permanent residents are to document a holistic evaluation. The short term tourist is generally interested in places of historical significance or arts and culture that they have heard others talk about. For example, tourists visiting Mexico City generally make it a point to visit the Zócalo, known for its historic presence as the second largest plazas in the world.⁶⁶ Many parades, protests and important events in history have happened in this place. However, on a normal day the expansive plaza is sparsely occupied, with a few tents congregated below the flag pole with political criticism and a few people gathered to share information and shout grievances. This is probably not the image of what many imagine when they arrive but to be in the Zócalo. However, during Dia de la Independencia, the crowded plaza filled with energy as the President addresses the whole country from a balcony above. Moments like this are what makes the Zócalo such a significant place and why people will visit even when there are no events. To stand and imagine how the energy would feel with tens of thousands of people surrounding them.

66 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

Other common tourist destinations for short term tourists consist of many significant buildings, museums and parks where vendors set up to thrive off the tourism market. However, if a tourist decides to stay longer than there are daily obligations that begin to change their experience. Just like anywhere in the world, when one is living in a place with daily responsibilities like work, grocery shopping and laundry their experiences are much different than a weekly tourist vacation. One quickly gets to know their surrounding better like the doorman, the parking attendants on your street and when the surrounding restaurants begin to open their doors and layout their tables and chairs. These daily events reveal more about the actual culture that any short stay could reveal.

There are still a major differences between the way a long stay tourist and a national resident see their surroundings. For any tourist there are always inevitable comparisons to familiar places in attempt to relate better to the experience. The desire to quickly understand the surrounding places their daily life like eating, shopping and safety is an instinctive desire. Long term tourists however have the opportunity to engage in people watching or site seeing that will better expand their cultural understanding of the place. It is valuable to understand how short time tourists experiences differ from the long term tourists and even permanent residents. The permanent resident usually does not want to surround themselves with the hustle of lost, confused people wandering aimlessly through the streets. The tourist's perspective dramatically effects the way tourist commodities adapt to appease the guests overall experience during vacation.

Desired Guests

The targeted guest would be Mexican tourists would have a desire for experiencing the outdoors free from most modern conveniences. Their desires could range from wanting a quiet getaway from the city to relax within the Ecolodge or highly active persons who want to ride horses, motorcycles, hike or rock climb. Environmental conditions they can expect within the site grounds are stargazing at night and views of

the natural environment. Both experiences warrant a desire for a quiet surrounding that can be implemented through upholding existing park rules of noise control. Other possible amenities can be considered for on site in future studies of what the target guest desires in their vacation experience. The adventurous tourists will want to know where they can explore and have all pertinent activities ready for their use.

The experience could be further alienated from the surrounding community if decisions are made to keep the experience strictly internal. However, through interview investigations, the primarily group that would be desired in marketing to are the Mexican residents from nearby cities. This would automatically assume they understand the local culture and practices making it easier for their emersion into the local community. Obviously there are great differences between city and country lifestyles however the difference is much smaller within its own culture than for a foreign person.

According to SECTUR, domestic tourism numbers have been increasing in the last ten years in Mexico due to the growing participation from middle and lower classes.⁶⁷ This increase in domestic travel makes Cumbres de Majalca a desirable destination for people living in nearby cities. Especially since all the existing lots have been purchased and there is a limitation for expansion based on the national forest protection. People would enjoy it if there were accommodations that were open to everyone and not only limited to knowing someone who owned a house there. With an increasing number of domestic travelers and providing the first permanent tourist accommodations in the park reinforces the idea for having the lodge and gives an insurance that theres a market that would support the concept.

In 2010, the bicentennial of Mexican Independence, and for the centennial of the Mexican Revolution were celebrated. The Mexican government decided to shift their funds in tourism toward the infrastructure and promotion in order to encourage citizens to travel and get to know their country. Cultural tourism was strongly promoted, and

67 Skanavis, Constantina, and Maria Sakellari. "International Tourism, Domestic Tourism and Enviornmental Education Can Find the Balance." *Tourismos: An International Multidisciplinary Journal of Toursim* 6.Spring 2011 (2010): 233-249. Jstor. Web. 13 Oct. 2011.

many promotional packages were offered by travel retailers. These actions, together with the measured economic recovery, boosted domestic tourism.⁶⁸

When analyzing the gathered information from various resources, there are apparent decisions that need to be made concerning the type of experience and tourist the design project will cater to. There's a Disney interpretation that can be offered to guests that blinds the guest from the reality of surrounding circumstances. In this case, the most important condition would mean shielding guests from knowing there is drug farming in the periphery of the park boundaries. There are many reasons for telling and not telling guests. In reality, the danger is minimal if the status quo rules are followed and no one approaches the areas in question. However, if guests do not know the areas they are forbidden to then they might accidentally happen upon it and if they do know where they are some curious persons may venture there anyway not understanding how dangerous of a decision they've made. So, in order to create a secure experience, guided tours outside the park constraints would be advisable for the safety of guests. There could be a simple yet firm explanation that land outside these constraints are private property and therefore need permission to access these parts.

Ideas gathered from the various people about Mexico City's close proximity to many other unique cities and the immense desire of people who want to flee the city on occasion inspires the intent behind an Ecolodge in Cumbres de Majalca. Destination cities around Mexico City run from large metropolitan areas like Guadalajara to small artistic communities. The options for traveling outside of the city are made very easy by car, bus or plane. Each mode of transportation is seemingly affordable so it is primarily based on what the traveler prefers. Information on the types of destinations that residents of Mexico City seek out for vacation can give further insight to understanding the kind of tourist the Ecolodge will be catering toward, the frequency of use, the distance a guest is willing to travel and how the destination is reached.

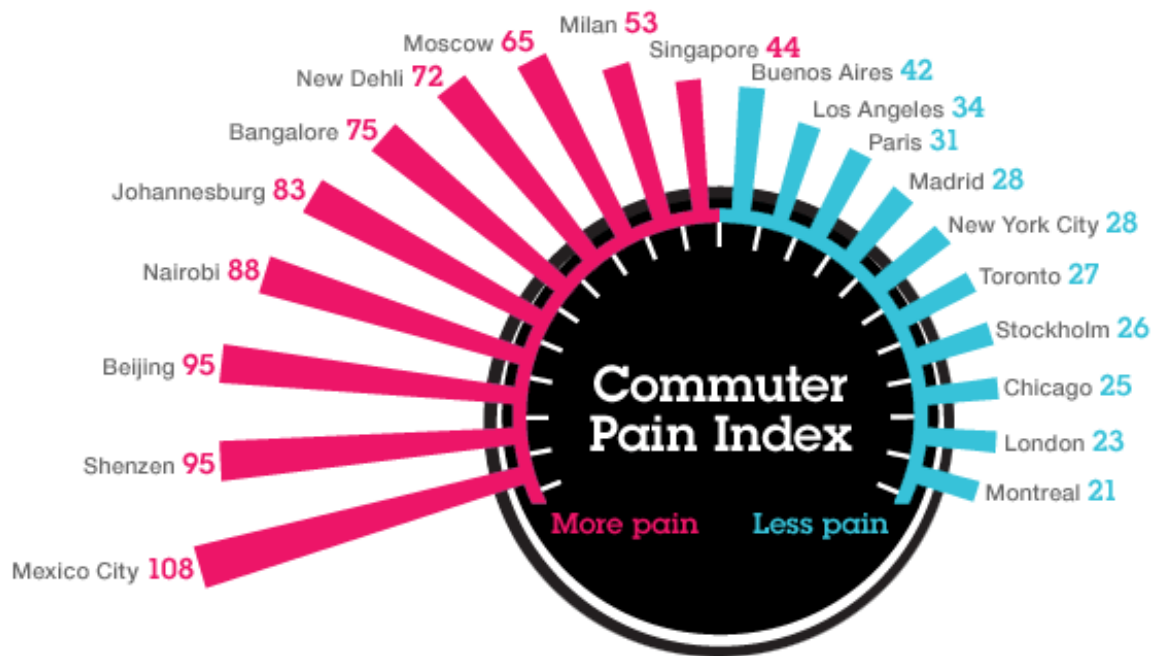
68 Skanavis, Constantina, and Maria Sakellari. "International Tourism, Domestic Tourism and Environmental Education Can Find the Balance." *Tourism: An International Multidisciplinary Journal of Tourism* 6.Spring 2011 (2010): 233-249. Jstor. Web. 13 Oct. 2011.

Modes of Transportation

There are three main modes of transportation out of Mexico City; plane, car and bus. Each mode caters to different aspects a user might need.

Air Plane-The plane in the last few years has grown in the frequency of flights and destinations for an affordable price in Mexico. The availability of many quick, cheap and direct flights from Mexico City to all over country has increased domestic tourism. With the help of the changing image of the airline companies from an exclusive mode of transportation to an open system available to all classes. Generally, people who are booking an airline ticket for a vacation are anticipating traveling further than six hours driving. Taking a flight to a destination outside the six-hour driving extents is more time effective and potentially less cost due to the high cost of toll roads throughout Mexico.

Car- A personal vehicle seems like a viable travel option whether it is owned or rented. There may seem to have many apparent advantages to having a vehicle available during a vacation. It leaves more variation in the travel plans base of very few limitations of location and participation in activities. However, colonial towns in Mexico were not



[Figure 24] Commuter Pain Index

originally designed for cars. Figure 24, demonstrates the turmoil that is directly related to traffic conditions in Mexico City. Often personal vehicles can be more difficult than public transportation due to the duration of travel, road conditions, gas prices and driver experience. When one stays in a city center there are many problems in finding available parking. While staying in a crowded city it is often more practical to keep the vehicle in one spot while exploring the center. However, it is easier to reach more rural settlements when having a vehicle because they are often off the main routes which have availability for public transportation.

Bus-The availability, affordability and sometimes most time efficient mode of transportation through Mexico are the bus lines. The highway systems are often funded by the toll systems which make them efficient to many different destinations throughout the country. Primarily the bus stations are located near the city center which makes it very easy to transport to the final destination. There are limitations with this method such as the bus schedule and frequency of stops that can be bothersome. However, it is a viable option among many to reach various destinations outside of Mexico City.

The most likely type of transportation that will be used to reach the Ecolodge is through personal vehicle because there is no current method of transportation to the site. The nearest city with an airport to Cumbres de Majalca is Chihuahua, Chihuahua. However, the probability of the common tourist arriving airplane and renting a vehicle is not the market the Ecolodge will be geared toward. Considerations will need to be made on where the vehicles can be parked with minimal invasion of natural environment. Not only will some specific design considerations need to be made on site but as a local community there should be an overall consciences for the future of the town. Making local policies that limit capacity, hours of vehicle operations and over all expectations for the future can help shape the way tourism will affect the area.

Travel Distances

Mexico City is such a busy bustling city it seems common for residents to flee the city chaos for the weekend or a week if possible. According to IBM's Commuter

Pain Index, in figure 24, Mexico City has the worst traffic conditions in the world, where commuters sit hours on end going to and from work, that it does not seem to be a problem to take the same amount of time without traffic to venture outside the city limits into a much different environment.⁶⁹ Because Mexico City is built on a dried lake bed, it is surrounded by mountains. These mountains are the general boundaries of Estado de Mexico, or the Metropolitan area of Mexico City. Beyond these mountains both the environment and the development changes. Every direction offers a different type of landscape ranging from rolling hills, rivers, lakes, beaches, deserts and jungles.

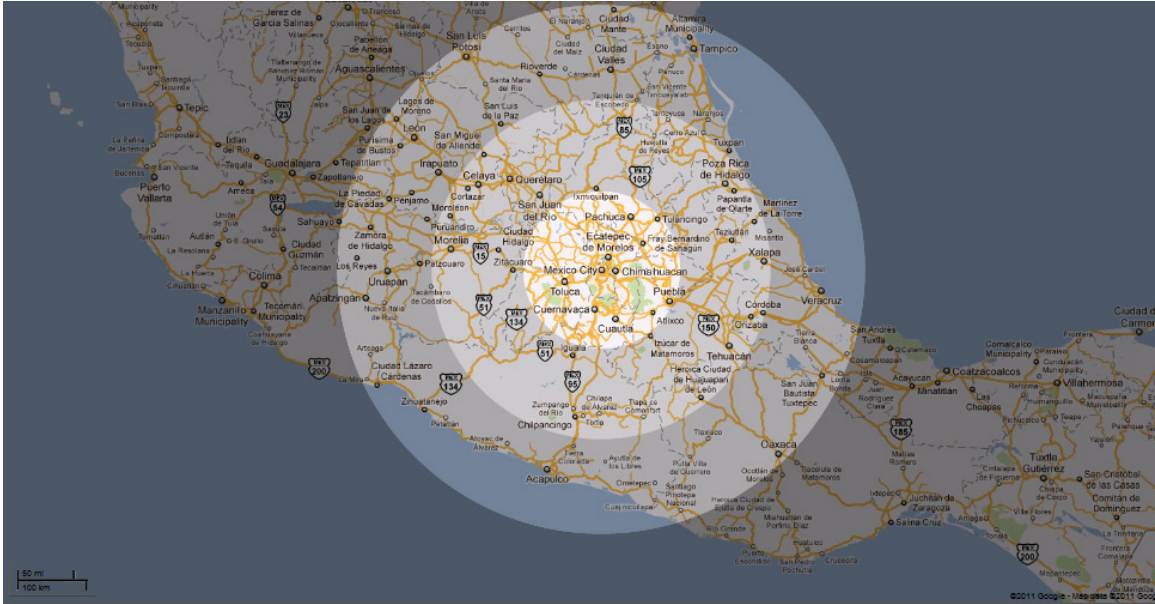
The type of person heavily influences their willingness to venture outside the city. Through interviews of many different people ranging in age, nationality and occupation the research has led to a better understanding of how far they are willing to leave their daily home. In general, the younger foreign groups of interviewees were willing to travel further and to various destinations. Their willingness to get in a vehicle and travel up to six hours for a weekend trip seems like a feasible idea.⁷⁰ Figure 25, depicts three circles radiating from Mexico City each circle represents a two hour drive. Their plans typically did not include a secured hotel or idea of what they were looking to do when they arrived. Only the major ideas of what the city is known for and a general direction maybe investigated before arriving. The same age group of people who are originally from the greater Mexico City area were willing to travel up to four hours for a weekend retreat.⁷¹ However, they usually have expectations to stay at a friend's vacation home or to a familiar hotel that has been recommended from someone they know.

Older generations view weekend retreats as a relaxing time away from the busy city. Normally to relax in their family vacation home. Usually these properties are located within natural environments that they can't find in the city including lush gardens, beautiful views or a unique landscape. Their activities are much more tranquil than those of younger generations. The weekends are to relax and not worry about the

69"IBM Traffic Congestion - Overview - United States." IBM - United States. N.p., n.d. Web. 14 Nov. 2011. <<http://www.ibm.com/smarterplanet/traffic>>.

70 Huberdeau, Carolin; Vidal, Laura; Weintraub, Maya. Personal Interview. 21 Sept. 2011.

71 Aguirrezabal, Federico; Lee, Carmen; Palos, Jose. Personal Interview. 5 Oct. 2011.

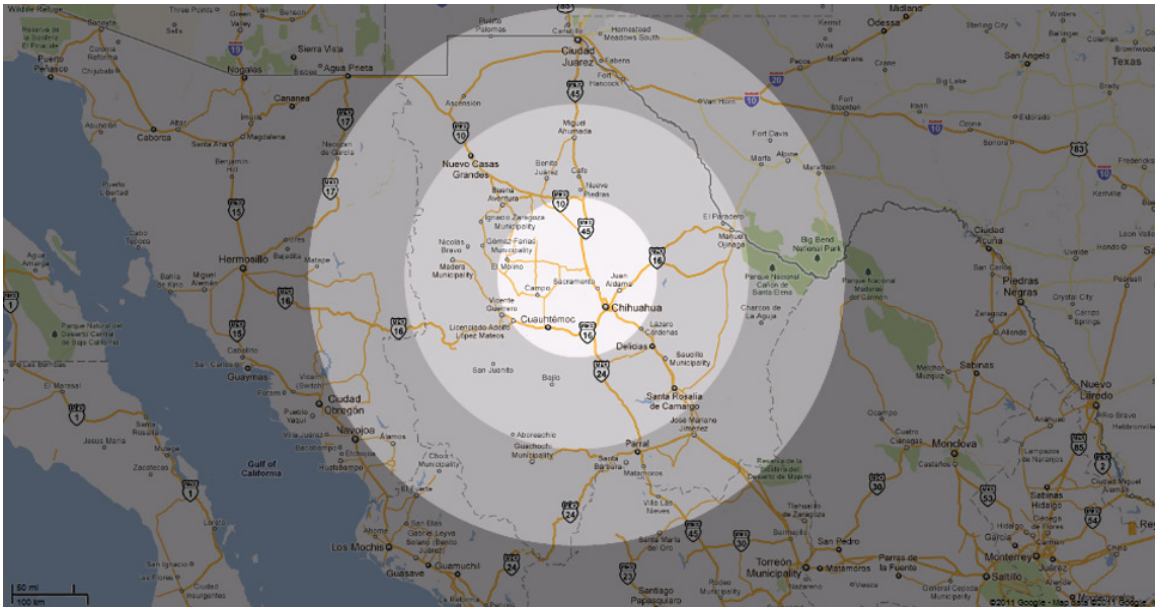


[Figure 25] Distance from Mexico City, the radius of each circle represents approximately two driving hours weekly stresses from work and the city. They are willing to only travel between an hour or two outside the city to their established destination. There is usually a common and familiar destination where they spend their weekend getaway.⁷²

When each group considers spending more than weekend in any particular destination their duration of vehicular travel is increased by an average of two hours or take a flight of a similar time span. Every year it is common for established families to take one large week long vacation. During these days, they tend to seek out more than just relaxation. Many families with young children usually pick destinations with activities such as water sports, hiking, horses, ATVs and so on. These experiences are not only to wear out the energetic kids but to go somewhere out of the city to be with nature. Even with an increase daily physical activity, these trips still seems much more relaxing than the weekly work stress and daily obligations.

Foreign tourists can travel a median distance of 4 hours flying to popular Mexican destinations known for their beautiful climates and fulfillment of specific desired expectations for their vacation. This group as said before, are seeking very different expectations from their vacation experience than the long term residents to Mexico.

72 Arroyo, Salvador. Personal Interview. 21 Sept. 2011.



[Figure 26] Distance from Cumbres de Majalca, each circle represents approximately two hours of driving

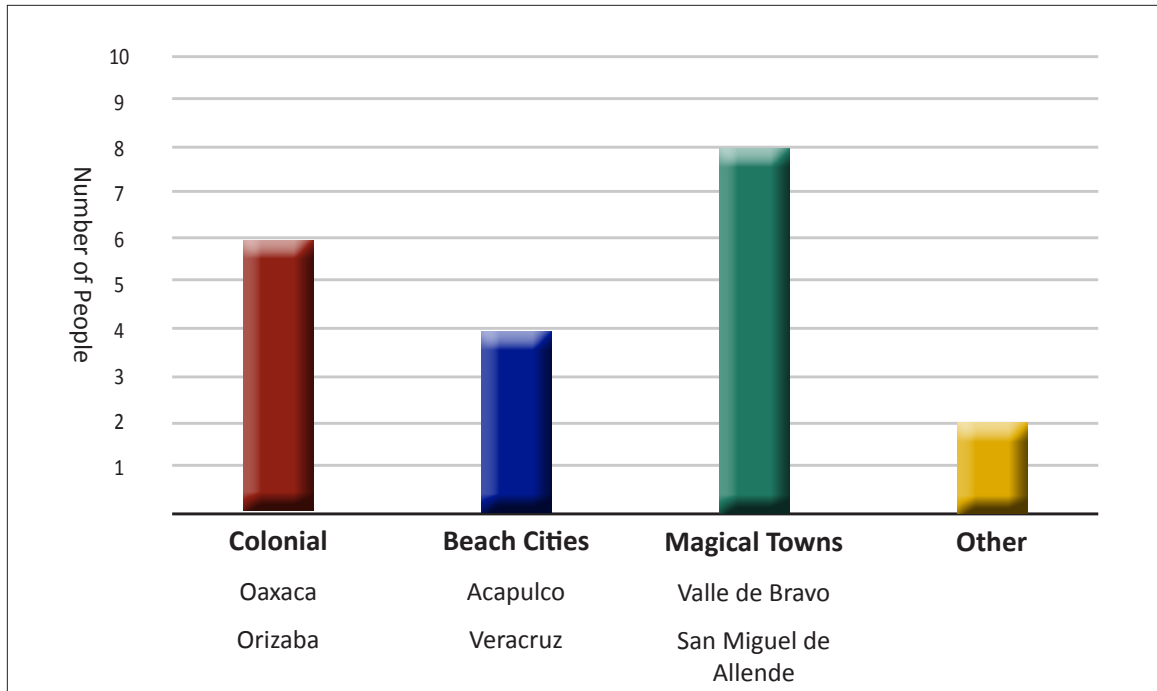
Many residents also enjoy the same destinations however they avoid participating in the same activities. Based on the information gathered on comfortable travel distances. It can be inferred that people in northern Mexico would share a similar tolerance in their travel distances.

Figure 26, depicts three circles radiating from Cumbres de Majalca National Park each circle represents a two hour drive. The main cities that the Ecotourism in Cumbres de Majalca would draw from are Chihuahua with 841,490 people and Ciudad Cuauhtémoc with 135,345 people.⁷³ Both of these cities are within two hours from the park, cities that are between two and four hours are Delicias and Santa Rosalia de Camargo. The furthest practical cities from which guests may arrive driving from are Ciudad Obregon, Navjoa, Ciudad Juarez and El Paso, Texas.

Areas of Interest Expressed by the Interviewed

To get a better understanding for the type of destinations that Mexican residents and long term tourists visit during the weekends from Mexico City, they were asked to name a destinations they would recommend and why. From the suggestions made by the interviewees, three selections were made from each duration of travel; two hour

73 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.



[Chart 2] Destinations Recommended by Interviewed

drive, four hour drive and six hour drive. Each destination shares incite to what aspects they are expecting from a weekend retreat from Mexico City. An analysis of the tourist's expectation for amenities, activities and experience between the existing destinations will help make conclusions about Cumbres de Majalca.

The Secretary of Tourism and FONATURE have been working to redistribute the allotted funds for tourism throughout the country. They are focusing their development and maintenance efforts in four major areas, such as colonial treasures, beach cities, 'magical towns' and ancient ruins.⁷⁴ Orizaba and Oaxaca are both classified as colonial treasures because their city centers date back from Spanish colonization and have been preserved for their beautiful structures. Valle de Bravo and San Miguel de Allende are classified as 'pueblos magicos' or small magical towns. These towns are usually small urban communities that visitors have described as magical based on their qualities and atmosphere. Secretary of Tourism strives to maintain the small town culture that exists and limits the growth or change within the town. Veracruz and Acapulco are beach cities

74 Wilson, Tamer Diana. "Economic and Social Impacts of Tourism in Mexico." *Latin American Perspectives* 35.37 (2008): 37-52. Sage. Web. 13 Oct. 2011.



[Figure 27] Orizaba Volcano

that attract more tourist than the other four locations because historically they have been tourist hot spots. The warm weather and beach communities are a huge draw for people who live in cold northern climates in the winter.

ORIZABA & CORDOBA: Colonial City - 4 Hours Driving Distance from Mexico City

Orizaba and its closely affiliated sister city of Cordoba are one of the safer areas in the country of Veracruz currently. Therefore, there are many people relocating to the area with their families to have more security in their daily lives. The city itself is located southeast of Mexico City at a base of volcano Pico de Orizaba. It is the highest points in Mexico standing over 18,000 feet high and third highest in North America.⁷⁵ Year round there is snow on the peak of the volcano and is completely covered in the winter. This is an international hiker's paradise to scale the mountain during the winter months because the glacier conditions are at their best at the peak. For less experienced climbers, more frequented trails are available to explore or conduct off-road explorations of the surrounding ecosystems. The town closest to the base camp is geared toward

75 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

guiding tourists up the mountain and have little else supporting their community.

The type of tourist that are interested in the less conventional adventure tourism in Pico de Orizaba are the category of tourists that would be interested in a Ecolodge. Their primary interests are in the sites they can venture to during the day. The mountain they can scale and the pride they take in conquering places many others have not ventured. For this type of tourist they have a different mind frame than the average tourist, they find joy in the surrounding environment free from modern amenities. The base camp in which visitors stay is maintained only by those who occupy it. So the removal of all trash and building maintenance is conducted by those who visit. The mountain treks are not regulated by any organization who limits the path in which the mountain is scaled. This gives the hikers the freedom to choose their path however, it also adds a hazardous element to the adventure. For many experienced hikers this is not a problem and almost liberating but to inexperienced person this can be a problem. Rock climbing and hiking trails in Cumbres de Majalca are not regulated through any state organization and can also be seen as a hikers paradise.

Orizaba's city community is clearly based on industry, which has been very easy with an adjacent river called Rio Blanco that runs between Mexico City and the Gulf Coast. The river is helpful in transporting any industry to the city or exported out of the country. Even though the economic history of Orizaba has been focused more towards industry rather than tourism, there are some culturally significant places to visit. Palacio de Hierro is a design by Gustave Eiffel that was brought from Brussels. The building is fully collapsible with 823,222 screws holding it together.⁷⁶ It is a special place to visit among others like the neoclassical City Hall with famous murals, La Concordia the largest bullring in the state equip with a geodesic roof and many other castles or cathedrals sprinkled throughout the city.

OAXACA: Colonial City - 6 Hours Driving Distance from Mexico City

Oaxaca is heavily dependent on tourism for its economy. Therefore, it has

76 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

carefully cornered its market toward cultural appreciation by promoting the traditional arts and maintaining the historic value the city. Many people have talked about Guelagueza that shares traditional dances from the area. Each show shares a bit of the native culture with guests visiting the area. Other traditional practices include a traditional sweat bath and Zapotec message.⁷⁷ The experience is said to be a very intense process with ritual chanting, customs and complete cleansing of ones body. People who wish to participate in these type of rituals must respect the culture behind it to make it a better experience for both the guest and the host.

Tourism is also supportive of the indigenous ceramics and textiles. They continue to make these products in the traditional way and guests are welcome to watch the process of making these beautiful products and learn more about the native people. The oldest archeological discoveries in the area are found just outside the city of Oaxaca at Monte Alban that dates back to 500 BC.⁷⁸ This area has been preserved for science and allows tourists to visit the ruins.

More active choices to see while visiting the city of Oaxaca is called cloud walking, it takes about six hours to see seven of the nine categories of plant species in Mexico. These dynamic ecosystems that are usually separated by thousands of miles can be discovered in a one day hike through the Sierra Norte de Oaxaca. Majalca embodies major ecosystems that have a precious transition properties worth preserving in the park. With the help of specialists these regions have be identified and carefully documented to preserve special species that make the area so unique. Obviously, there is a market for those interested in exploring rare ecosystems to study and experience a place unique from anywhere else.

VALLE DE BRAVO: Pueblos Magicos - 2 Hours Driving Distance from Mexico City

Valle de Bravo is a popular destination for wealthy people to have a second home because it its convenient location and it is dramatic change of environment and climate.

The area has cooler temperatures than nearby cities of Mexico City and Toluca due to

77 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

78 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.



[Figure 28] Town Square next to Church of San Francisco de Assisi

its high elevation in the mountains. The town became a popular destination in the late 1940's after dams were constructed to provide electricity to Mexico City, which created a manmade lake. The colonial city center is marked with a church dedicated to Saint Francis, surrounded by white adobe buildings with red terracotta roofs.⁷⁹ Connections between the buildings are through narrow winding roads through the uneven hillside and looks internally toward the church while the views are oriented toward the lake below. Newer buildings on the periphery of the central core begin to face the lake and the further away, the more private the establishments become.

Many people interviewed recommended a visit to Valle de Bravo for the overall ambience noted physically by the similar appearance in buildings and the diversity of activities the town embodies. They describe the town as a balanced place where one can relax and do nothing or have many available opportunities to be active and boat,

79 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

hike, paraglide, shop or walk around the town. During each trip Valle de Bravo is told it offers the perfect relief from the big city.⁸⁰ Many restaurants, cafes, bars and hotels are in the central area of town. Music fills the plaza on the weekends as well as the hourly ringing of the church bells. Here the vendors exist however, their persistence is much less compared to those in Mexico City. The plaza is filled with families and persons sitting or dancing with the music.

Depending on the type of tourist interviewed, the expected accommodations seemed to depend on the duration of time in Mexico City. Many people who have lived in Mexico City their whole lives have a friend or family member who has a house in the area and would prefer to stay there. Foreigners and Mexicans originally from other parts of the country will probably stay in the main part of the city. A weekend trip with someone who owns a house is a much different experience than staying a hotel. When staying in a home there are usually more family oriented activities. Even when people my age coordinate with their friends to go, another family member may hear word of it and want to join for the weekend.⁸¹

Cumbres de Majalca is similar in its natural mountainous landscape and availability to participate in lively activities. However, it does not have a historic part of town nor any substantial commercial amenities to support a tourist economy. People who visit the park have a similar 'magical' experience to people who stay in private homes in Valle de Bravo. It is a tranquil surrounding accompanied with friends and family that encourages relaxation and appreciation of nature.

SAN MIGUEL DE ALLENDE: Pueblos Magicos - 4 Hours Driving Distance from Mexico City

The small town of San Miguel de Allende has been drawing in tourists from all over the world with its magical allure. A once declining city was discovered by some artists who were greatly inspired by the Colonial structures and narrow cobblestone roads. As more artists began to gather from the United States, Canada and Europe restorations began on many of the historic buildings. The city center is filled with

80 Ponce, Elsa. Personal interview. 10 Oct. 2011.

81 Fernandes, Luis. Personal interview. 29 Oct. 2011.

Colonial architecture and the city tries to monitor any modernization by implementing design guidelines. This will eliminate the possibility of any neon signs or billboards that detract from the existing beauty.⁸²

This destination is much different from many of the other selected vacation destinations because this is the only one that more foreign tourist visits to than domestic. Its increasing popularity is beginning to interest many wealthy people from Mexico City however, many have not invested in real estate because the Euro and US dollar have over inflated the price of homes in the area. Foreign investors in real estate have fallen in love with the place and do not wish to go anywhere else.⁸³ While domestic investors have many destinations that can choose from that are not as overpriced. They can have a nicer view, more space in the house and more land in another destination for much cheaper.

There are few similarities between San Miguel and Cumbres de Majalca other than their, magical allure. The inspirations triggered by San Miguel are through the architecture and city layout. This aspect can however influence future constructions in the park, designing structures that are unique in character and create a significant culture for the town. In recent constructions in Majalca have begun to reflect more contemporary designs and seem to take pride in representing the surrounding areas by using natural materials and framing landscape views. It is an opportunity to influence the visual essence of the town and create a place that strives to inspire visitors.

VERACRUZ: Beach City - 6 Hours Driving Distance from Mexico City

Veracruz is the largest city in the Mexican State of Veracruz set on the coast of the Gulf of Mexico. This port city is not regularly visited for its typical tourist activities. However, they are beginning to instill typical tourist attractions such as an aquarium and a city museum. The city center like so many other Mexican cities has a Zócalo next to the main cathedral, Virgen de la Asuncion.⁸⁴ The main attraction in Veracruz is for

82 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

83 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

84 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.



[Figure 29] Coastline of Acapulco

the various outdoor activities the surrounding areas have to offer. Among them are beaches and snorkeling along the coast and hiking, water rafting, ziplining and camping throughout the lush landscape.

Tourist who come here note that it is a more authentic experience because the city and environment is not geared toward catering to mass groups of people. Visitors are directly emerged into the existing structure that exists for the local community which makes the overall experience feel more cultural. Its landscape is more lush than the rest of the country, which identifies a closer in relation to Central America rather than the rest of Mexico. In the midst of the popular adventure tourist destinations there is a heavy impact from drug trafficking. Drug cartels view the port city as an important hold for exportation of products and have been publicly displaying their power by killing opposing drug affiliates and displaying their bodies in one of the busiest streets while masked and heavily armed.

The dichotomy of adventure tourism and drug related activity could be paralleled

with the conditions in Cumbres de Majalca. However, on a much less violent level, the problem between drug control and the existing community can pose potential problems for visitors. It is important to figure out how to make it safe for guests and keep the current conditions as peaceful as possible within a state of national chaos. The better part of being in a small town rather than a large settlement like Veracruz is there is less components to fight over. Most of the killing happened due to primary control over distribution and less on the agricultural side of growing the product.

ACAPULCO: Beach City - 5 Hours Driving Distance from Mexico City

Acapulco is one of the closest beaches driving from Mexico City. Here residents can flee the bustling city to find the calm Pacific Ocean waves hitting the shore. It is another common destination among the wealth of Mexico City to have timeshares or vacation homes. There are two desired destinations that tourists stay in this region; the primary bay with the city center and the adjacent bay where the hotels are much less dense. The primary bay has high-rise buildings that pack the coastal front and a vibrant night life that is well renowned among foreign tourists and Mexican people.⁸⁵ This area is known more for the typical touristic experience rather than the authentic experience. The adjacent bay is closer to an authentic experience with various comfortable accommodations. There are still comfortable hotels to stay among many other people however there are thousands fewer people. In this bay there are more physical activities available to the common tourist like riding ATV's or horses along the beach. It provides a balanced opportunity for guests to relax in the comfort of their hotel amenities and still enjoy the beauty of the natural environment.

In recent years the drug problems in Acapulco is directly affecting its tourism. A once packed destination seems quite desolate with the amount of vacancies. Posted throughout the streets and in particularly large in front of the night clubs are campaign banners reading "Habla Bien de Aca", speak well of Acapulco, this is an attempt to make people feel more safe in the city and to encourage better publicity rather than the drug

85 Noble, John. Mexico. 10th ed. Footscray, Vic.: Lonely Planet, 2006. Print.

affiliated killings. Sadly the majority of people do not care to risk their safety just for a vacation. They will choose somewhere different where they feel safer.

This particular marketing approach to change the cities reputation is not a viable approach to handling the true gravity of the situation. To just ignore the root of the problem and act as if there were no precautions that can be a foolish approach. This attempt is however one of the only state wide campaigns that has even addressed the issue of drug warfare. This is an inspiration for further representation and protection through out Mexico against drug crimes.

Evolving Influence on Ecotourism

The last 10 years the government influences only a few specific destinations. As a result there has been an increase in privatized projects.⁸⁶ Without government funding the projects are completed without lengthy political processes and constant hold ups. This has allowed more foreign investors to contribute to the tourism growth. In conjunction with independent investors and an increase in domestic tourism, there is a potential increase in markets like Ecotourism. Small establishments in rural areas can improve the surrounding community they reside in by providing much needed work for current residents.

As a result of concentrated tourism destinations there is an internal migration of workers from rural communities to urban societies. There are opportunities for both male and female employment in a tourist-based city. Opportunities are vastly available during the construction period on the infrastructure, hotels, restaurants, commercial development that all contribute to supporting the large settlement. Continuous employment from supporting hotels, restaurants and commercial services supports a large workforce who migrates from all over Mexico.

Ecotourism can be a positive impact on the dislocation of local residents from the community they have lived their whole lives in. If there is an employment opportunity closer to their homes then they would not be forced to leave in order to find a stable

86 Wilson, Tamer Diana. "Economic and Social Impacts of Tourism in Mexico." *Latin American Perspectives* 35.37 (2008): 37-52. Sage. Web. 13 Oct. 2011.

work and pay. Keeping the local community stable will insure generations can remain in the same location allowing their knowledge of the area to be passed along as well as enriching the existing culture and traditions that reside in the particular location.

In many large tourists' destinations, there is a separation from the people who are being served and those who are serving them.⁸⁷ Cumbres de Majalca has a similar dynamic. Nearby town of Ejido Soledad and Guerachic have more working class people who help support the owners of second homes in Majalca. Existing work opportunities for people living in these communities are farming, minimal construction, maid services and maintenance work. However, maid services and maintenance work does not provide full time employment for the workers because most owners do not visit every weekend. The employees are left with not enough money to support their needs.

An Ecolodge would provide an opportunity to help the community by employing some of the residents through the construction, maintenance and daily services. It would reduce the possible displacement of local families and keep the culture among familiar residents who can share their knowledge with guests at the Ecolodge.

SECTUR, Secretary of Tourism, has identified ecotourism and adventure tourism activities in Mexico in order to evaluate its overall potential. Adventure tourism is categorized as activities that require a key component of nature to make the activity possible like a river and white water rafting or a mountain for hiking.⁸⁸ Adventure tourism activities are a launching point to establishing ecotourism facilities to preserve the existing environment. The two terms have been commonly used together however they are not dependent on one another.

Ecotourism is derived from the words ecology and tourism inferring that the development should be sustainable in not only the manmade elements but in its effect on the environment as a whole. Sustainable development can be implemented in any existing environment however ecological development considers factors beyond the

87 Wilson, Tamer Diana. "Economic and Social Impacts of Tourism in Mexico." *Latin American Perspectives* 35.37 (2008): 37-52. Sage. Web. 13 Oct. 2011.

88 "Ecotourism in Mexico." SECTUR-Secretaria de Turismo. Government, 24 May 2010. Web. 21 Sept. 2011. <www.sectur.gob.mx/en/secturing/sect_8980_ecotourism_in_mexico>.

site and building materials. Tourists are starting to appreciate developments that are in balance with nature because it not only provides an authentic experience but ensures that the existing natural elements will continue to exist for years to come.

SECTUR research shows that over 72 thousand US dollars have been spent on adventure or ecotourism in Mexico during 2001. This clearly demonstrates a desire for further development and discovery in these markets. Foreign tourists account for 64.2 percent of total participants in adventure or ecotourism.⁸⁹ The growth of ecotourism destinations are directly contrasted with the rapid development in first world countries around desired natural elements. Many famous natural destinations have been exploited beyond the point of no return. Developing nations have an opportunity to learn from first world countries mistakes and construct themselves in a responsible manner that will preserve the natural environments that attracts tourism in the first place.

89 "Ecotourism in Mexico." SECTUR-Secretaria de Turismo. Government, 24 May 2010. Web. 21 Sept. 2011. <www.sectur.gob.mx/en/secturing/sect_8980_ecotourism_in_mexico>.

Chapter Eight

CASE STUDIES ON ECOLOGES

The term, *ecolodge*, defines a specific type of accommodation that considers environmental impact levels, each building's connection to the environment and guest education of neighboring areas and local communities. The way each example in the study defines these aspects depends greatly on the site based on contextual elements. Environmental impact can range from integrating the facility into the natural biological components to building material choices or holistic active and passive systems. The term *ecolodge* sets expectations for the continuation of local community integration through education, employment opportunities or financial gain. Researching precedent studies of ecolodges is a tool to develop a better understanding of visitor and local community's expectations in the design project.

The principles for ecolodge standards are to preserve and conserve nature, the local community must benefit from the ecolodge's presence through community outreach or education programs and tourists also need to be educated about the surrounding natural and cultural environment.⁹⁰ Meeting these three principles are very important to keep everyone involved in the tourist experience aware of the important environmental conditions. This way the natural environment will continue to be respected and avoid exploiting its resources and beauty. The intent is to keep the environment pure so that visitors can enjoy it for many generations.

The level of authenticity for each ecolodge is based heavily on the environment it resides. Whether the accommodations range from as few as two rooms to seventy-five rooms the standard of environmental and social responsibility is important.⁹¹ Every location has different resources and attributes that contribute to the overall success of the ecolodge. Every project cannot be held to the same checklist but should evaluate how effective the impact of the design is in the specific culture, environment and climate. Using natural resources, indigenous technologies, biological conservation,

90 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 11.

91 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 9.

sustainable building materials, and reuse of building purposes and materials are just a few attributes explored in reaching an appropriate standard. Each ecolodge will have to investigate its surroundings to find the best possible solutions for design, construction and daily operation.⁹²

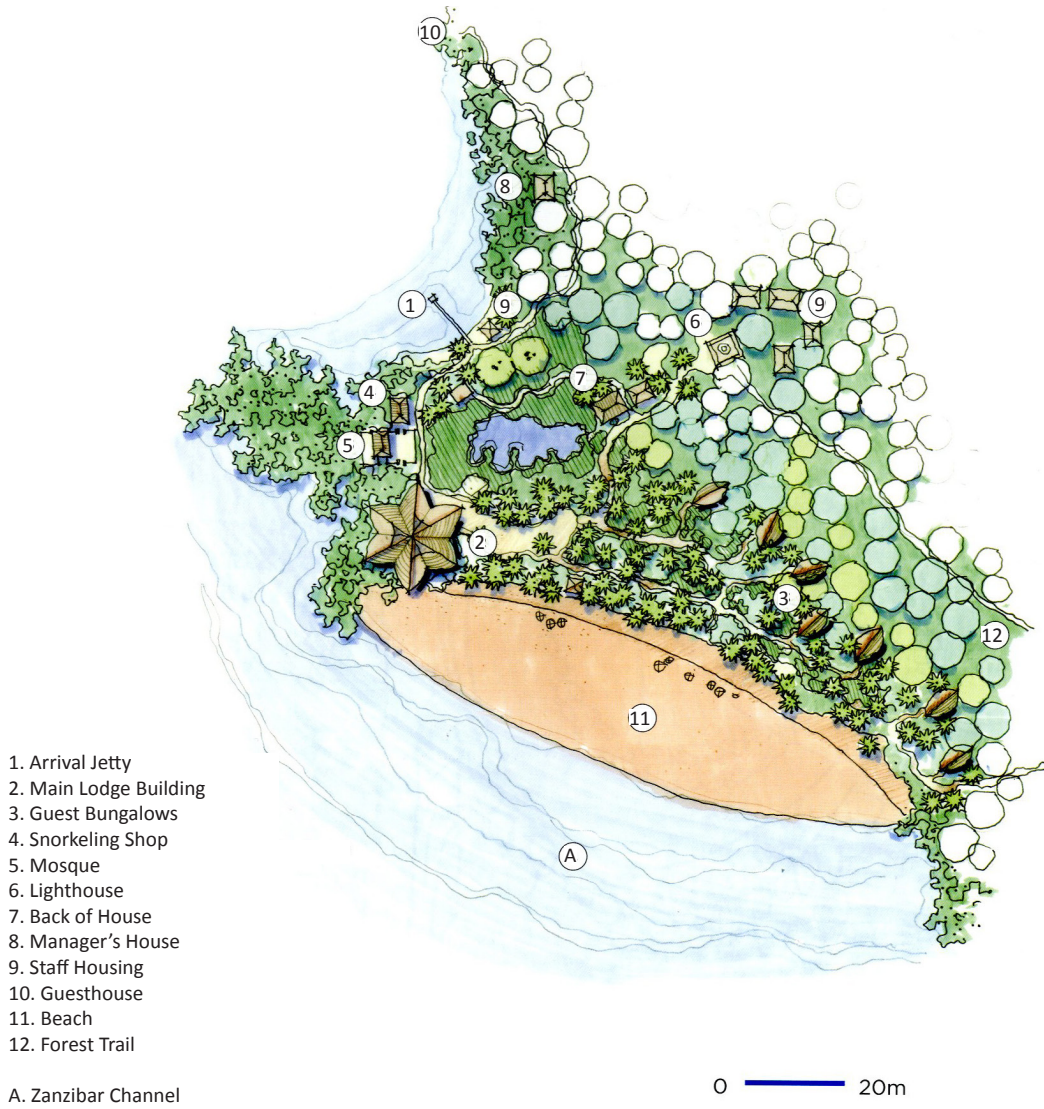
The precedent studies were sought out through various web articles and Hitesh Mehta's book entitled *Authentic Ecolodges*. Six case studies around the world were selected for their notable qualities and further investigated through their personal web page or through articles written about their project. Each location show in figure 30 offers specific attributes that can influence future considerations on the design project in Cumbres de Majalca. Understanding each case study's strengths and weaknesses will help influence aspects that can be enhanced project.



[Figure 30] Location of selected ecolodge precedent studies

92 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 11.

CHUMBE ISLAND ECOLODGE
CHUMBE ISLAND, TANZANIA



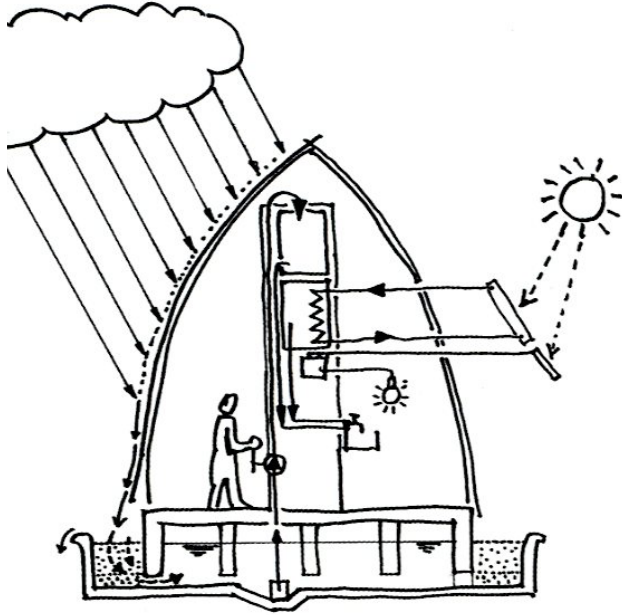
[Figure 31] Site Plan of Chumbe Island Ec Lodge

Climate:		
Tropical Climate	Temperatures 50°- 80°F	Rains Heavy during March-May and light November and December
Arrival:		
Boat from Zanzibar Island		
Program:		
7 Bungalows- double bed, living room, full bathroom	Visitors Center with Dining Facilities	Snorkeling Shop
Staff Housing	Lighthouse	Mosque
Managers House	Back of House	
Amenities & Activities:		
Reef Sanctuary popular for snorkeling and scuba diving	Low Tide Trails expose reef and sandbar that can be explored on foot during low tide	Forest Reserve accounts for 90% of island with exotic birds and animals
Historic Monuments from Colonial Period		
Sustainable Qualities:		
Fully solar powered	Rainwater Harvesting	Compost Toilet
Grey water filtration system		

[Chart 3] Chumbe Island Ecolodge Parameters

Chumbe Island Ecolodge unique physical and cultural context are the reasons it was selected as one of examples. Each building is made from an intricate wood structure that is distinctively shaped to optimize natural ventilation and covered in thick palm frond thatching, shown in figure 33. Each is equipped with operable devices can be opened and closed to regulate desired airflow through the interior spaces as well. The large pitched roof and materials promote a completely passive ventilation system influenced by the indigenous building techniques illustrated in figure 32. These materials are readily found on site and can be easily replaced as needed however because of conservation efforts some materials were brought by boat from Zanzibar.⁹³ This allowed for minimal strain on the natural resources and ecosystems that are very important for scientists to study.

93 "Chumbe Island Coral Park / East Africa / Tanzania / Zanzibar." Chumbe Island Coral Park. <http://www.chumbeisland.com/> (accessed July 3, 2011).



[Figure 32] Active and passive systems for rainwater collection and reuse



[Figure 33] Operable ventilation

The placement and size of the bungalows, demonstrated in figure 31, also strive to make a light footprint on the land to make the least impact as possible. Conservation policies were collectively derived by the local people, researchers, and owner who is a German conservationist to keep the environment pristine. Therefore guests are limited to fourteen at a time to ensure environmental quality and participate in an educational program to better understand the reef sanctuary. A series of classes are also sponsored for local school visits and teaching workshops to gain environmental awareness through the community and employment opportunities for former fishermen and locals to work at the ecolodge.⁹⁴ These policies protect the current environment and seek future protection of other remarkable locations.

In order to integrate the bungalows with modern conveniences such as electric and plumbing. Electrical light is generated through a solar panel on the roof that provides artificial light after the sun sets. The design also harvests rain water from the roof form and filters it into a cistern that is pumped by hand through a solar water heater for showers and sinks use⁹⁵. The use of modern technology allows for a more comfortable

94 "Chumbe Island Coral Park / East Africa / Tanzania / Zanzibar." Chumbe Island Coral Park. <http://www.chumbeisland.com/> (accessed July 3, 2011).

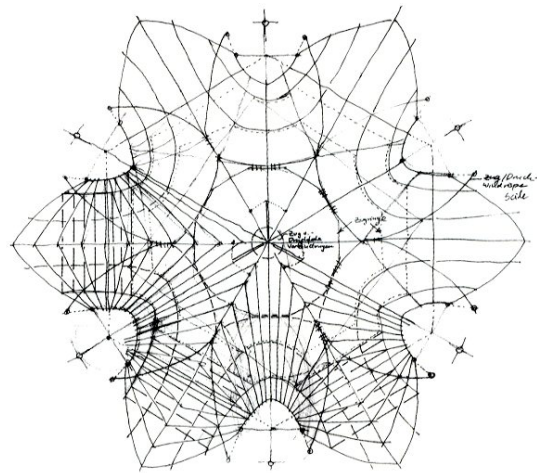
95 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 53-55.



[Figure 34] Main Lodge Building



[Figure 35] Roof Structure

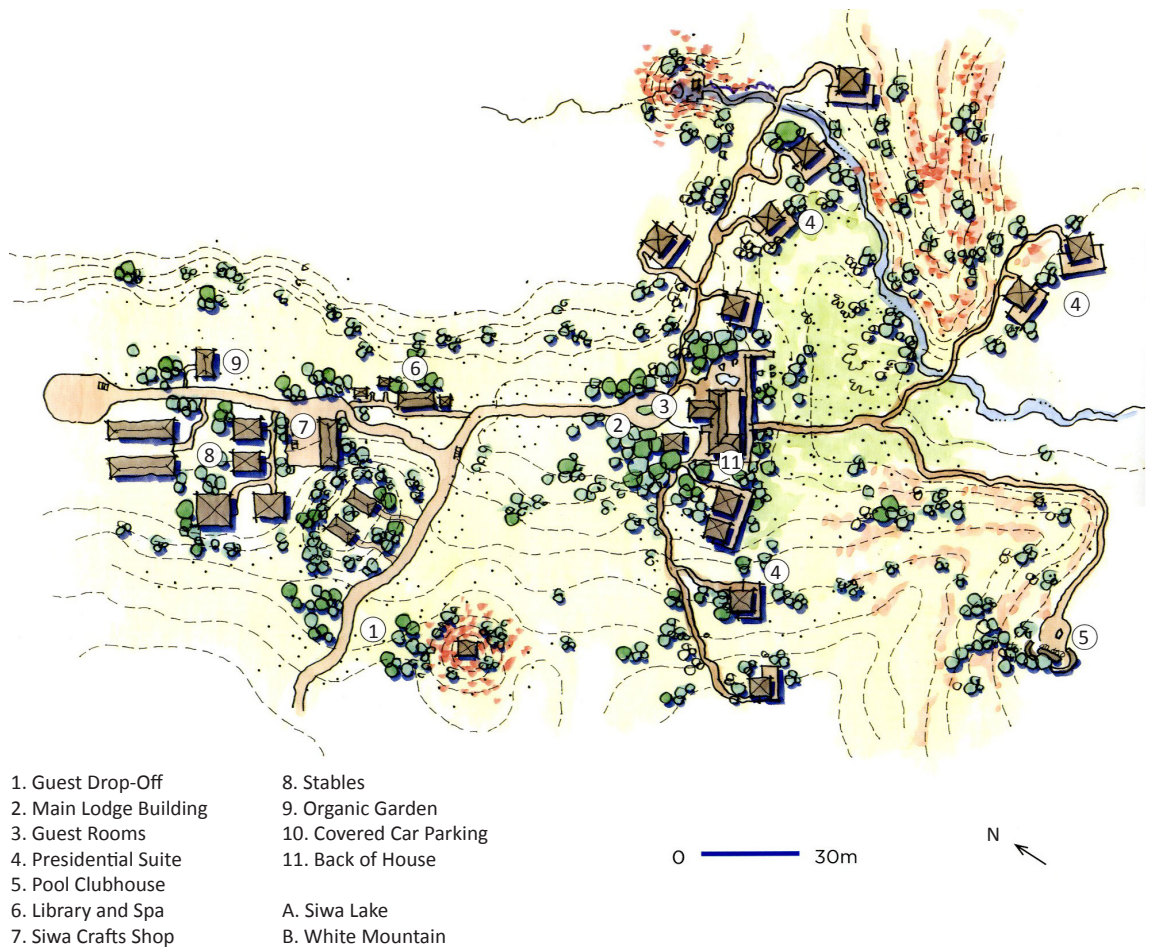


[Figure 36] Roof Structure

stay without damage to the environment.

Chumbe Ecolodge successfully fulfills many key components that define an ecolodge and goes above and beyond the call of environmental responsibility to minimize its impact. It has become an example for the local community to follow in future ventures. Utilizing lessons of environmental education, conservation of ecosystems, indigenous building materials and techniques like in figure 34-36, and incorporating modern technology to preserve and enhance the guest experience.

DAMARALAND CAMP
 DAMARALAND, NAMIBIA



[Figure 37] Site Plan of Damaraland Camp

Climate:		
Dry	Temperatures 55°- 73°F	Perennial Drought
Arrival:		
4 x 4 vehicle access only		
Program:		
10 cabins	Main Lodge with Dining Facilities	Fireplace
Bar	Small Store	Night Dining Boma
Staff Housing	Staff Dining	Maintenance Workshop
Back of House		
Amenities & Activities:		
Cultural Tours to Local Villages	Rock Engravings at Twyfelfontein	Track Endangered Black Rhinoceros
Stargazing	Game Drives into Huab River Valley	
Sustainable Qualities:		
Construction Processes uses "ecosandbag" walls, reeds & canvas	Solar Power Lighting	Solar Power Water Heaters
Dual Flush Toilets	Energy Saving Appliances	Black water treated in bio-organic trickle plant

[Chart 4] Damaraland Camp Ecologne Parameters

Damaraland Camp is a great example of creating a destination for adventure tourists to experience an environment remote from urbanization. It is a notable ecologne for its accomplishments, in chart 4, in biodiversity conservation. Located in the dry Haub River Valley is the home to desert adapted elephants, black rhino and various other plains animals like mountain zebra, giraffe and springbok⁹⁶. The wildlife safaris, led on 4x4 vehicles, are led from the camp take guests to see plants and animals that thrive in the dry desert. The tours offer a chance to educate guests on the unique ecology in the African desert plains and share cultural insight to the region. Local guides have the best understanding for animal migration patterns and knowledge of various plant species to give guests the best opportunity to experience authentic desert biodiversity.

96 "Damaraland Camp, Torra Conservancy, Huab River Valley, Damaraland, Kunene, Namibia - Luxury Lodge & Safaris." Wilderness Safaris. "Luxury African safaris, accommodation & camps promoting ecotourism and conservation. http://www.wilderness-safaris.com/namibia_kunene/damaraland_camp/introduction/ (accessed 21 July 24, 2011).



[Figure 38] Damaraland Guest Accommodations

Another popular destination near the ecolodge is the rock engravings at Twyfelfontein.

The ecolodge resides on an 870,000 acre conservancy, offering accommodations photographed in figure 38 for twenty-two guests and a main lodge space that offers communal area for dining and information⁹⁷. It works in partnership between Wilderness Safaris and the local community to preserve the natural environment. Architecturally the camp demonstrates typical desert accommodations in a sophisticated way. Recently renovated in 2009, each unit is raised on wooden decking and covered by an extending thatched roof. The walls are made partially from adobe style material and canvas tent material⁹⁸. The interior is all naturally ventilated by the building form and permeable materials. The main lodge building is an open floor plan that allows air to travel seamlessly through dining and community living spaces off of the pool area.

Damaraland Camp is an extraordinary destination to immerse guests into a unique

97 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 139-141.

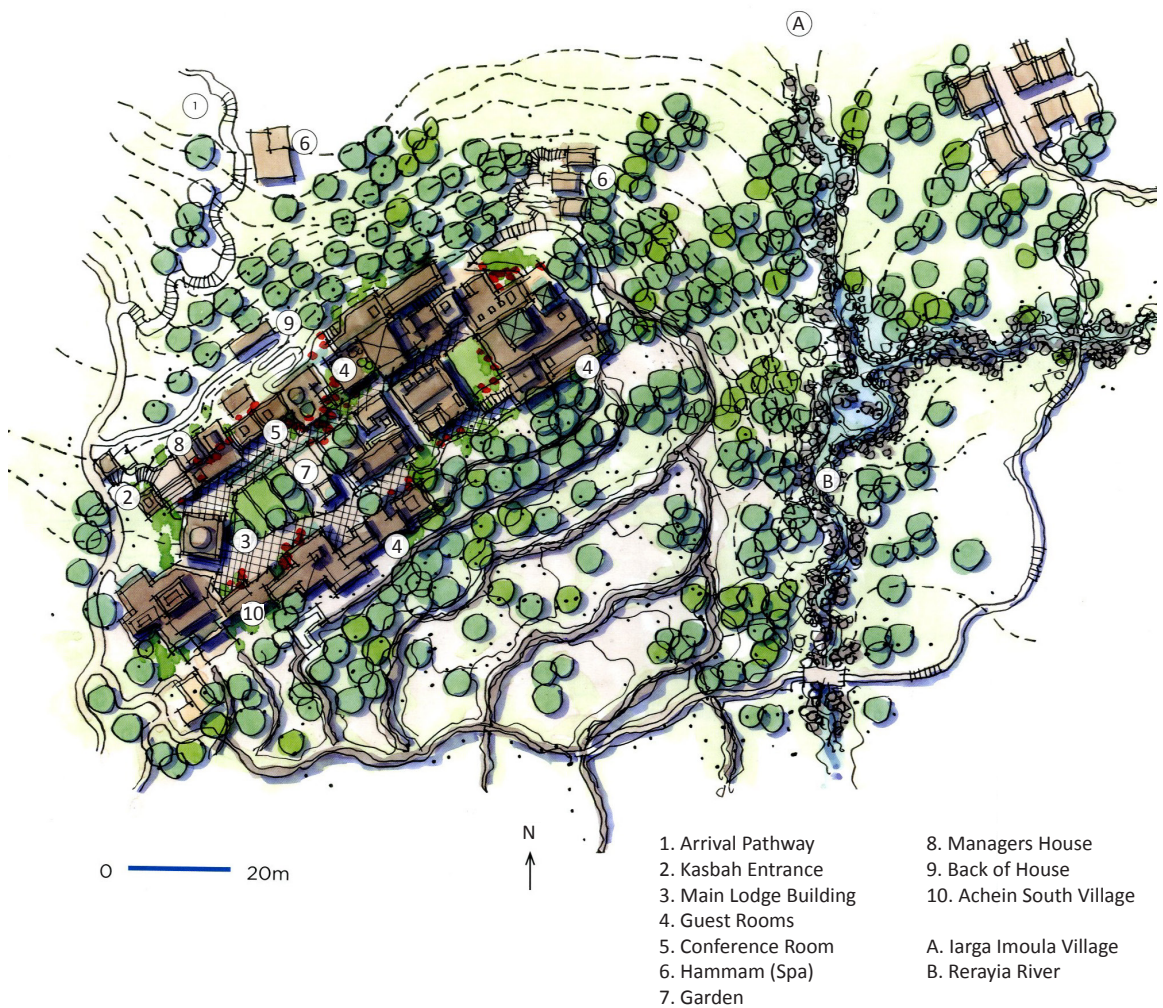
98 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 139-141.



[Figure 39] Damaraland Lodge Communal Space

environment. Its accommodations are made to be comfortable for western travelers while continuing to reflect distinctive cultural aspects of the local community. These tented structures have evolved into permanent buildings that will continue to support the local community and help to preserve the natural environment. Guided tours through the 870,000 acre conservancy are beneficial to both guests and guide to see places only locals would know how to navigate to and educate visitors on the natural ecosystems that support this environment. Visitors who wished to venture out on their own would not be able to find and identify particular plants or animals.

KASBAH DU TOUBKAL
IMLIL, MOROCCO



[Figure 40] Site Plan for Kasbah Du Toubkal

Climate:		
Moderate Sub-Tropical	Temperatures 55°- 95°F	Winter Months rainy
Arrival:		
Located in a small village of Achein, cars are parked 20 meters from entry	Luggage is brought up by mule	Takes six hours driving from main airport
Program:		
11 in suite rooms and 3 Beber Salons	Main Lodging Building	Dining Facility for 100 people
Conference Room for 60 people	Hamman (Spa)	Managers Family House
Back of House	Garden	
Amenities & Activities:		
Base Climbing Mount Toubkal	Horseback Riding	Mule trekking
Steam Baths	Skiing	
Sustainable Qualities:		
No power tools used in construction or renovation	Environmentally friendly materials brought in by mules	Spring water gravity fed
Biodegradable soaps and shampoos	Recycled waste sent 60 km	

[Chart 5] Kasbah Du Toubkal Ecolodge Parameters

Kasbah Du Toubkal is located on top of a hill above the small village of Achein and strives to submerge the guests into the Berber hospitality⁹⁹. Its link to the surrounding mountains and cultural experience make it a destination to consider. Kasbah Du Toubkal prides itself on being a hospitality center and not a traditional hotel. Visitors are welcomed to the lodge as guests to a home. Strong Berber traditions carry the way staff interacts with guests and the few salon style rooms that are a cultural way of lodging. The salons are similar to a western hostile style, where many people share one room and have the rest of the facility as a communal space. The guests in the salons have a male and female bathroom that can have a maximum capacity of 10 guests. The remaining suites have private bathrooms with their room.

99 Mehta, Hitesh. Authentic Ecolodges. New York: HarperCollinsPublishers, 2010, 239-240.



[Figure 41] Exterior Spaces at Kasbah Du Toubkal

This ecolodge can be a base point where further exploration is launched or a destination for cultural immersion. Located at the base of Mount Toubkal, adventurous tourists may stay a night or two at Kasbah Du Toubkal before setting off for a week excursion up the trails to the top of the mountain. Those who seek the Ecolodge as its destination will be happy to find trails nearby that explore the mountain base and valleys. Those who stay a few days will have the opportunity to see how the community interacts and grow an appreciation for the Berber lifestyle.

The compound once belonged to a federal chief who used it only as a summer accommodation. When it was bought, renovation began to convert the spaces into an ecolodge. All repairs were made without the use of power tools, due to no electricity, and all materials were trekked in by mules¹⁰⁰. Most materials used in the renovation were found in the surrounding environment however other materials needed were

100 "Kasbah du Toubkal | Morocco's Premier Mountain Retreat." Kasbah du Toubkal. <http://www.kasbahdutoubkal.com/home.html> (accessed July 13, 2011).



[Figure 42] Interior Spaces at Kasbah Du Toubkal

brought from the larger urban settlements. Architecturally the Ecolodge is designed in traditional Moroccan style with beautiful archways and exposed oleander beams next to the beautifully tooled adobe walls. The buildings that make up the lodge are slightly terraced to follow the changing contours of the hill top. The integration of courtyards within the complex reveals typical Moroccan style which helps to sustain the complex's needs.

Foreign guests have the opportunity to submerge themselves into a unique Berber culture. Providing daily interaction with the staff and surrounding community strengthens the visitors experience as a whole. Setting expectations for cultural interaction is a way to define the type of guests who wish to visit the ecolodge, tourists who do not have a desire to experience the Berber culture would not choose Kasbah Du Toubkal as their destination. Defining guest expectations is a careful way to prescribe to a particular type of guest and can be used in the future Doctorate Project.

CROSSWATERS ECOLOGE NANKUNSHAN RESERVE, GUANGDONG



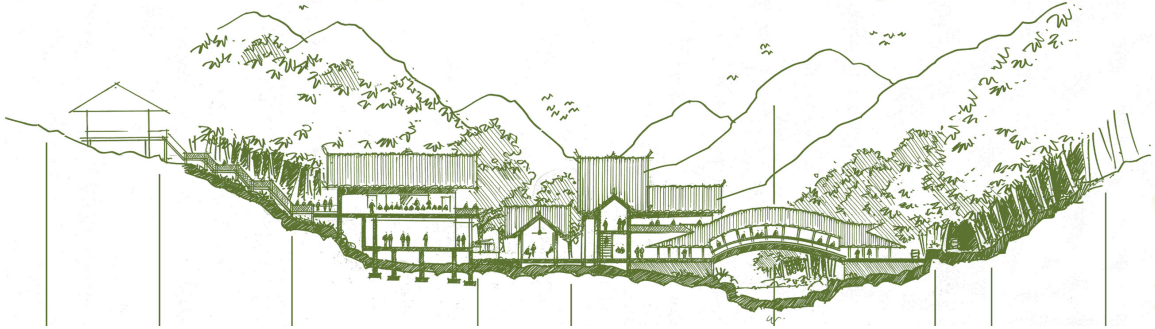
[Figure 43] Site Plan for Crosswaters Ecologe

Climate:		
Subtropical- Warm and Humid	Temperatures 65°- 90°F	Monsoons through the summer
Arrival:		
Drive 80 miles from Guangzhou		
Program:		
53 Villas- single, double villas, river and bamboo villas as well as luxury suites, Presidential and Honeymoon	Main Lodge-Reception and dining	Conference center
Spa center	Library	Stargazing Tower
Senior Staff Housing	Back of House	Nature Activity Center
Garden and Orchard		
Amenities & Activities:		
Bird watching excursions	Stargazing	Treatments for body and mind
Natural Pools of water	Trails exploring 2000 types of plants and animals	
Sustainable Qualities:		
Bamboo roofs, floors and bridges	Recycled tiles, railroad ties on boardwalk	Produce farmed on site and locally

[Chart 6] Crosswaters Ecolodge Parameters

Crosswaters Ecolodge is a centralized retreat for guests to experience harmony with nature. Its design reflects the Chinese cultural heritage and continual relationship between guests and the environment. Upon arrival visitors walk through a bamboo forest, to remind everyone to leave concerns at the door and to take in the surrounding environment. As the grounds are further explored planners carefully created moments in the landscape to reflect the views and beauty of the landscape. This is a common practice in Chinese gardens and is thoughtfully crafted into the experience to enhance its cultural ties.

The amenities and activities that take place at the lodge are all available nearby and each is laid out to maximize the upmost relaxation and education of the environment and its cultural significance. Activities such as gardening, can teach guests



[Figure 44] Section of Crosswaters Ecolodge



[Figure 45] View to river from bridge

the types of plants that thrive along Mount Nankun. Other educational activities that reflect a connection to the environment is the butterfly garden and natural pools. All these activities are located on the lodge grounds and continually establish connections between the natural world and human interaction. Evoking an appreciation for the unique environment in which the lodge resides.

Architecturally Crosswaters Ecolodge is designed to reflect aspects Feng Shui. The villas are positioned to front the river and have their back to the mountains to continue the flow of energy through the landscape. The materials used in construction are selected to reflect local culture and minimize overall environmental impact. On site harvesting of bamboo is used throughout the lodge in structure, landscape and even interior furnishings. Its presence reflects the renewable nature of the material and its diverse uses. The villas are also inspired by traditional Hakka structures with extended



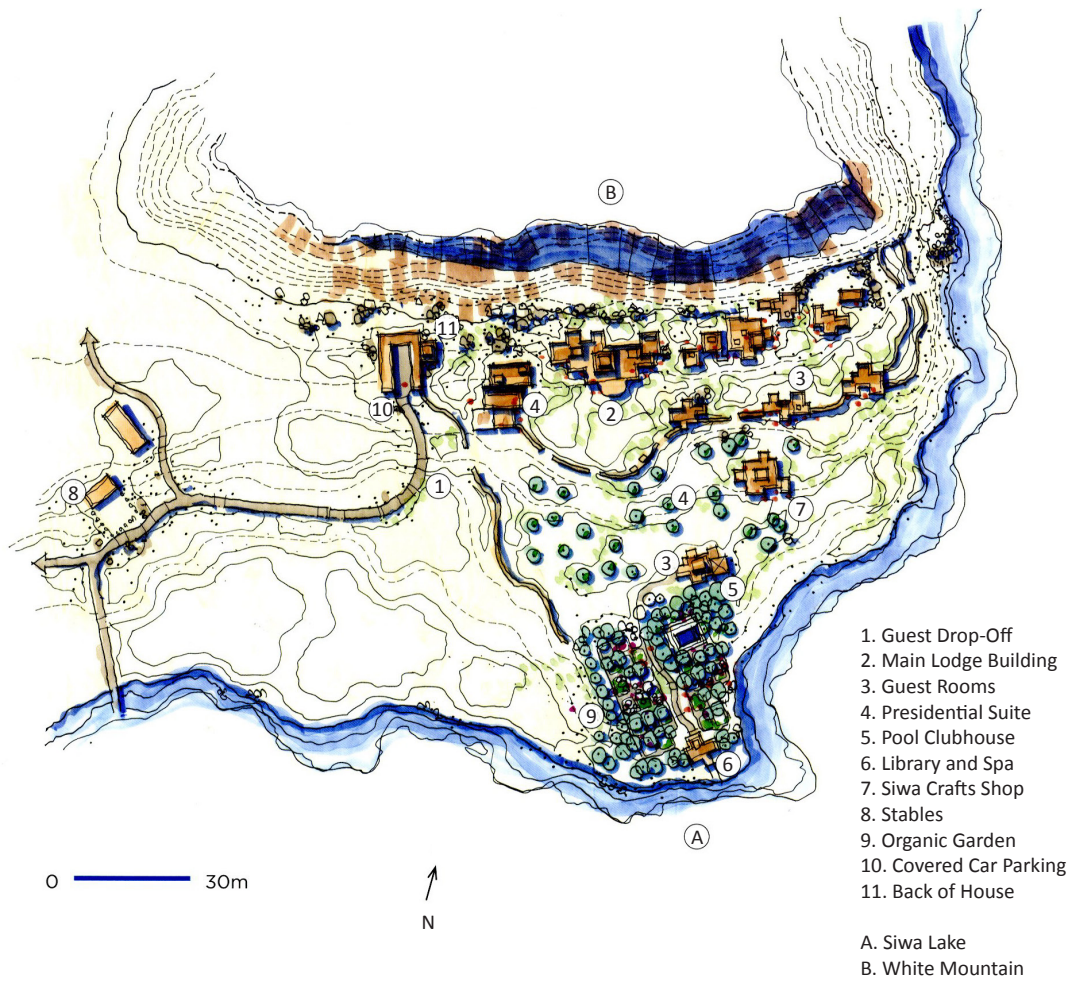
[Figure 46] Crosswaters Accommodations

roofs and mud walls.¹⁰¹ Crosswaters Ecolodge differs from the other examples chosen because of it is centered on finding a balance between man and nature both through its architecture and through the human body and mind.

As a case study analysis Crosswaters is an ideal example for using sustainable materials. It holds a record for largest use of bamboo in a commercial project and utilizes recycled products like tile and rock.¹⁰² The use of these materials is not only sustainable but it continues the continuity between man-made interventions and natural environment. Future design decisions will consider how materiality will play into the overall perception and experience.

101 "ASLA 2010 Professional Awards | Crosswaters Ecolodge." American Society of Landscape Architects (ASLA) | [asla.org. http://www.asla.org/2010awards/370.html](http://www.asla.org/2010awards/370.html) (accessed July 5, 2011).
102 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 17-18.

ADRERE AMELLA
SIWA OASIS, EGYPT



[Figure 47] Site Plan of Adrere Amella

Climate:		
Dry	Temperatures 68°- 110°F	
Arrival:		
From Cairo, an eight hour drive by any vehicle		
Program:		
40 rooms	Main Lodge Building- dining and reception	Pool side Clubhouse
Library and Spa	Siwa Crafts Shop	Stables
Organic Garden		
Amenities & Activities:		
Sand Dunes of Great Sand Sea	Local Guides to visit fossil fields from ancient seafloor	Shops and Market in town
Horseback Riding	Indigenous construction techniques from salt rock and clay	
Sustainable Qualities:		
Diesel powered water pump	Thick mudwalls to insulate without Air Conditioning	Food grown on site

[Chart 7] Adrere Amellal Ecolodge Parameters

Adrere Amellal is a successful example of ecotourism in western Egypt. Located in a natural oasis in Siwa allows for plentiful natural resources. However the real jewel is its centuries of isolation from large urban development. The inhabited community has created their own culture and customs that is much more traditional than large cities. The intent behind Adrere Amellal is to promote the local community and enhance the natural and cultural identity.¹⁰³

Architecturally the lodge exemplifies ancient wisdom and creativity of Siwan master builders. They are built in all natural Casbah style which blends seamlessly into the landscape. The mud brick is made from a kershef, a mixture of rock salt and mud.¹⁰⁴ Each wall is built from this thick material to ensure high thermal qualities from the dry heat outside. Interior spaces feel cool like an interior of a cave and share a similar spatial

103 Mehta, Hitesh. Authentic Ecolodges. New York: HarperCollinsPublishers, 2010, 103-105.

104 "Adrere Amellal." Adrere Amellal. <http://adrereamellal.net/> (accessed July 31, 2011).



[Figure 48] Accommodations at Adrere Amellal

qualities created by the small window openings. These openings are small to mitigate heat transference and are placed carefully to promote natural breezes through the interior space.

The activities promoted by staying at Adrere Amellal are visiting nearby environmental highlights like exploring fossils from the ancient sea floor or beautiful sand dunes. Guests who stay at Adrere Amellal are appreciative of the cultural heritage and are interested in an authentic experience free from electricity and modern communication technology. Staying here is an opportunity to free ones self from daily commodities and emerge into a much simpler lifestyle.

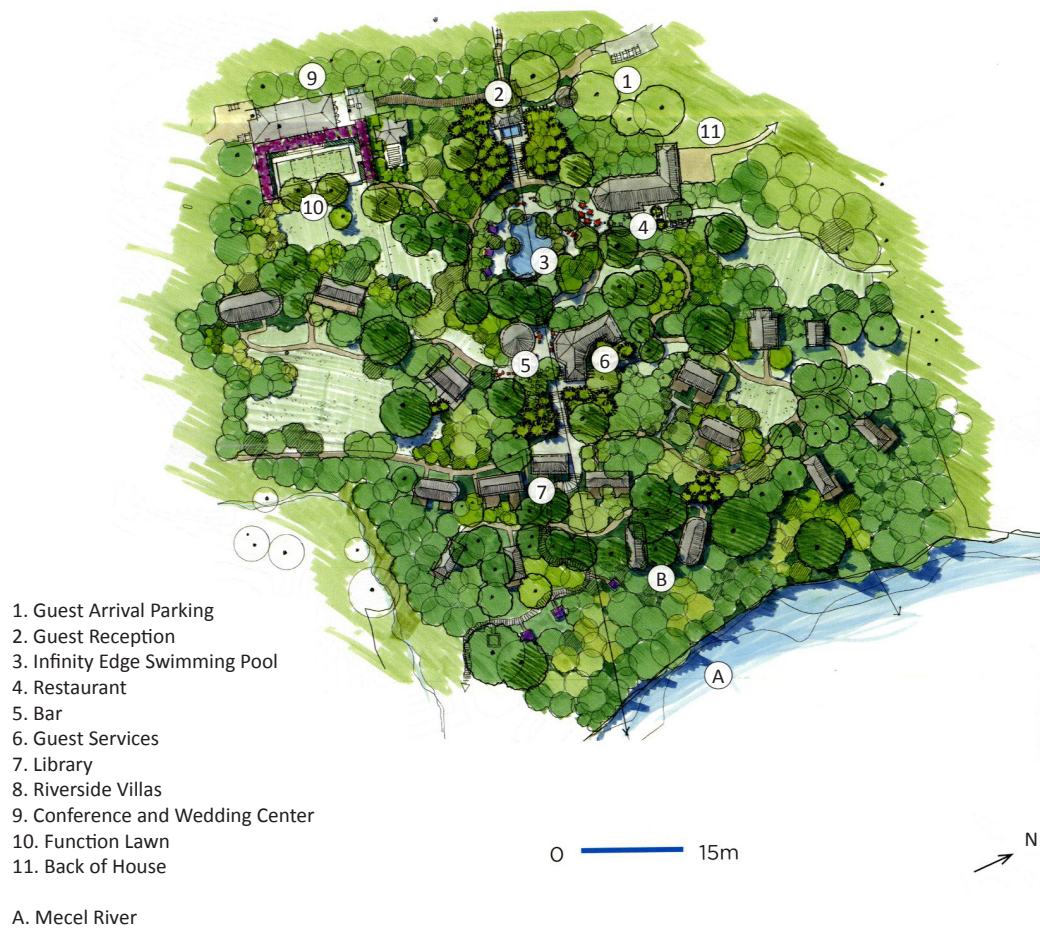
The conscience decisions made in building and opening Adrere Amella clearly define the users they prefer to have as guests to their accommodation. Individuals who wish to amerce themselves into another culture with adventurous activities would



[Figure 49] Contextual View of Adrere Amellal

choose to visit here. This and many other decisions are important aspects to consider when designing an ecolodge. The level of modern conveniences is an easy way to minimize a particular market of visitors. First the developer needs to keep the local community in mind. Considerations are made to minimally change the existing village as a preservation of its cultural beauty. The region in this case is known for their traditional customs and crafts. The more visitors who come will affect the local community. It is important the visitors who are there are respectful of the culture and also encourage preservation of their traditional practices so they are not lost to modern commodities or over development.

THE LODGE AT CHAA CREEK
CAYO DISTRICT, BELIZE



[Figure 50] Site Plan for the Lodge at Chaa Creek

Climate:		
Tropical climate	Temperatures 63°- 88°F	High Humidity
Arrival:		
Short drive from San Ignacio Town- 2 hours from Belize International Airport		
Program:		
23 Cottage Rooms- various sizes; treetop, orchard, spa and casitas	Guest Reception and Services	Bar and Restaurant
Library	Conference/Wedding Center	Natural Interpretation Center
Destination Spa	Stables	Wood Shop
Back of House		
Amenities & Activities:		
Bird watching	Butterfly Farm	Horseback Riding
Canoeing	Hiking	Mountain Biking
Swimming Pool	Off site Archeology tours	Cave Expeditions
Sustainable Qualities:		
Fresh produce grown on site	10 Summer Tents without electricity	Reduce Reuse Recycle Program
Basic Eco-friendly products		

[Chart 8] Chaa Creek Ecolodge Parameters

The intent behind the Lodge at Chaa Creek came from the owners who purchased the land and felt called to create a place that responded to the natural environment and culture in Belize. They strive to integrate each building into the landscape to best coexist with nature and traditional building practices. It is important to the owners to have the local people involved in the ecolodge's evolution and commitment to learning from their traditional knowledge.

The guest experience at Chaa Creek provides a comfortable place to stay while encouraging an adventure tourism experience. Typically guests stay here for near by adventurous activities such as exploring cave systems, tropical trails, and Mayan

archeological sites that are all apart of the 365 acre private reserve.¹⁰⁵ During the day guests usually spend their days exploring the vast reserve and returning as the sunsets to relax at the beautiful ecolodge. Architecturally the cottages blend into the jungle landscape with pitched thatched roofs and many are raised on wooded stilts to promote natural ventilation.¹⁰⁶ Spatially they continue to respond to the environment with indoor/outdoor connections and use of local materials. The owners also strive to connect guests to the existing culture and to its historic roots by having on site farming and a cultural center to educate visitors on traditional practices and promote community involvement with the local community. Chaa Creek is a firm believer in leaning from local culture to sustain environmental balance.

Clearly defining the intent of the ecolodge helps to better understand the type of visitors who would choose to stay here. Generally, guests would probably be active persons who have a desire to understand the local culture in Belize and are willing to dedicate time through education or community service.

105 "Chaa Creek Wildly Civilized." Lodge at Chaa Creek. <http://www.chaacreek.com/> (accessed July 3, 2011).

106 "Chaa Creek Wildly Civilized." Lodge at Chaa Creek. <http://www.chaacreek.com/> (accessed July 3, 2011).



[Figure 51] Facilities at Chaa Creek



[Figure 52] Exterior View of Guest Unit

The success of the ecolodge depends on a holistic blend of the physical structures, the tourist impact on local community and environment and creating a healthy state of being for everyone and everything involved¹⁰⁷. A careful balance between these aspects will sustain a future that reflects similar qualities of beauty and preserved traditional knowledge.

The Lodge at Chaa Creek is an example of a holistic approach when defining an ecolodge. The intention began with community, guests and environment all in mind. This process allowed the local community to participate in the organic growth of the lodge itself. Through analyzing the site, it appears as if additions have gradually been made to expand and continually get better for the surrounding environment and respond in a cultural way. This natural growth demonstrates a much different style than many of the other examples appear to have been completely planned before they were built.

107 Mehta, Hitesh. *Authentic Ecolodges*. New York: HarperCollinsPublishers, 2010, 91-93.

Conclusion

Through the exploration of the six case studies on ecolodges it is apparent that each is truly unique to the environment it resides. However they all are built on a similar respect for the environment and local community. Their intentions are to preserve both aspects to create a market that appreciates diverse cultures and environments that will be protected for years to come. Each example studied went more in depth on aspects that pertained to their culture or geographic location.

Chumbe Island is an exceptional example of using renewable resources power modern conveniences like electricity and rain water filtration. It has made clear conservation policies to protect the natural reefs and ecosystems on the island. Their over arching theme is only having a particular amount of human impact on the island that can be sustained by the environment itself. Living and building within the

Precedent Study	Location	Climate	Arrival	Capacity	Activities/ Amenities	Sustainable Qualities
Chumbe Island Ecolodge	Tanzania, Africa	50°-85°F Tropical	By Boat	14	Scuba Diving Forest Reserve Historic Monument Low Tides Trail	Solar Powered Rainwater Harvesting Greywater Filtration Compost Toilet
Damaraland Camp	Nambia, Africa	55°-73°F Dry	4 x 4 Vehicle	20	Safari Exploration Village Tour Rock Engravings Stargazing	Construction Process Solar Powered Blackwater Treatment Energy Saving Appliances
Kasbah Du Toubkal	Morocco, Africa	55°-95°F Dry	6 Hours Driving	32	Base Climbing Horseback Riding Mule Trekking Steam Bath	Construction Process Local Materials Gravity Fed Water Recycled Bamboo
Crosswaters Ecolodge	Guangdong, China	60°-90°F Temperate	2 Hours Driving	100	Natural Pools Stargazing Mind & Body Treatments	Bamboo Materials Recycled Materials Produce Grown On site
Adrere Amella	Egypt, Africa	68°-110°F Dry	8 Hours Driving	80	Sand Dunes Fossil Field Tour Village Market Horseback Riding	Construction Process No Electricity Produce Grown on Site Natural Ventilation
Lodge at Chaa Creek	Belize, Central America	63°-88°F Tropical	2 Hours Driving	46	Cave Exploration Hiking Mountain Biking Horseback Riding	Recycling Program Eco-Friendly Products Produce Grown On site

[Chart 9] Ecolodge Comparison

environment's capability is extremely important for future reliability on resources. Constantly checking the balance between human impact and the environment will create a place that is respectful and appreciative of the sites natural wonders.

Damaraland Camp is a niche for adventure tourism to explore the desert plains and discover its ecological systems such as plant life, river systems and animal migration. Guided tours in places like this give guests an experience that they would not be able to find if they explored on their own. The knowledge of the region that each guide possesses is what makes each trip a success in finding animals and pointing out species that may go unnoticed by tourist. This is also an opportunity to teach guests the way to treat this environment for a lasting landscape.

Kasbah Du Toubkal demonstrates complete cultural immersion into the Berber lifestyle, surrounded by architecture and environment that supports its cultural base. Through their webpage it is clearly stated that their operation is more as a guest in a home rather than a hotel. So guests would experience the customs and practices of the host family. The opportunities to not only visit a rich environment but to experience a place as a local person would is a beautiful idea that can be carried into further design decisions.

Crosswaters Ecolodge shows strengths in using sustainable materials but more significantly their cultural beliefs are carried out from entry throughout the entire compound. It's complete design is to continue the flow of energy from the environment. Doing this allows an utmost state of relaxation and mental rejuvenation. Finding a cultural identity that pairs well with hospitality and tourism creates a marketable place to stay. Marrying the two together in turn teaches guests about the people and place they are there to visit.

Adrere Amella also takes pride in its cultural heritage. However, their ecolodge is located in a small community which changes the ratio of influence between local and visitor. To balance the type of people how would visit, they made clear decisions on not utilizing electricity. Therefore the architecture is natural ventilated and at night they

are guided by candles or lamps. This experience is much different than if it were to be electrically powered. It is valuable to make decisions such as this to help define the type of visitors and to create an experience that is authentic to the local community.

Chaa Creek is an organic formation of buildings that continue to change based on knowledge acquired from local persons and strive to become sustainable. It lends itself as an example to continue learn and grow even after initial construction. The local community has been invited to contribute, work and teach at the ecolodge. This helps the owners and community form a place they can both be proud of and share customs and environment that surrounds the lodge.

All of the ecolodges have a lesson that can be extracted and utilized in future ecolodge endeavors. First, decisions need to be made on how the ecolodge will impact the community and environment. Then choices are made to enrich the culture surrounding the site. Continuing to achieve balance and continuity among the local community and visiting prospects. In turn all construction and material decisions will strive to respect the environment. Daily operation will continue to educate guests and allow them to experience the local practices. These operations can bend and mold to best represent the unique environment and culture.

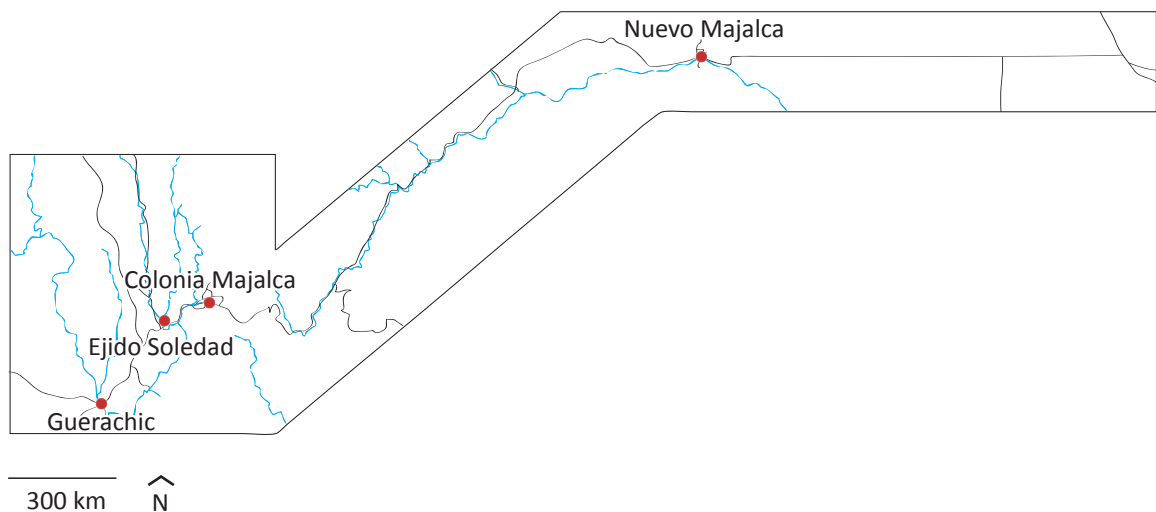
Doctorate Project

Chapter Nine

CONTEXT ANALYSIS

The location based on historic, physical and man made boundaries are very important in revealing cultural components. Cumbres de Majalca national park is located near the center of the state of Chihuahua in Mexico. Chihuahua is a state adjacent to the border to the United States with Texas and New Mexico. Present conditions in Chihuahua are influenced by both American and Mexican politics, culture and way of thinking. Historically, this region was also between two significant civilizations of Pueblo Indians and Aztecs of Mesoamerica. Both historic and modern day divisions create a unique blend between very different cultures. The physical context of the site is a transition point between desert along the eastern half of Chihuahua and mountains typology on the eastern half of the state. Thus, the center region creates unique environmental conditions that make the area significant as a tourist destination. These borders and boundaries are important factors that influence the over arching essence of park.

The park boundary, in figure 53, is protected from the main highway access to the central park area at the summits. The boundary protects from further development in the park unless on lots that were grandfathered in when the park was established.



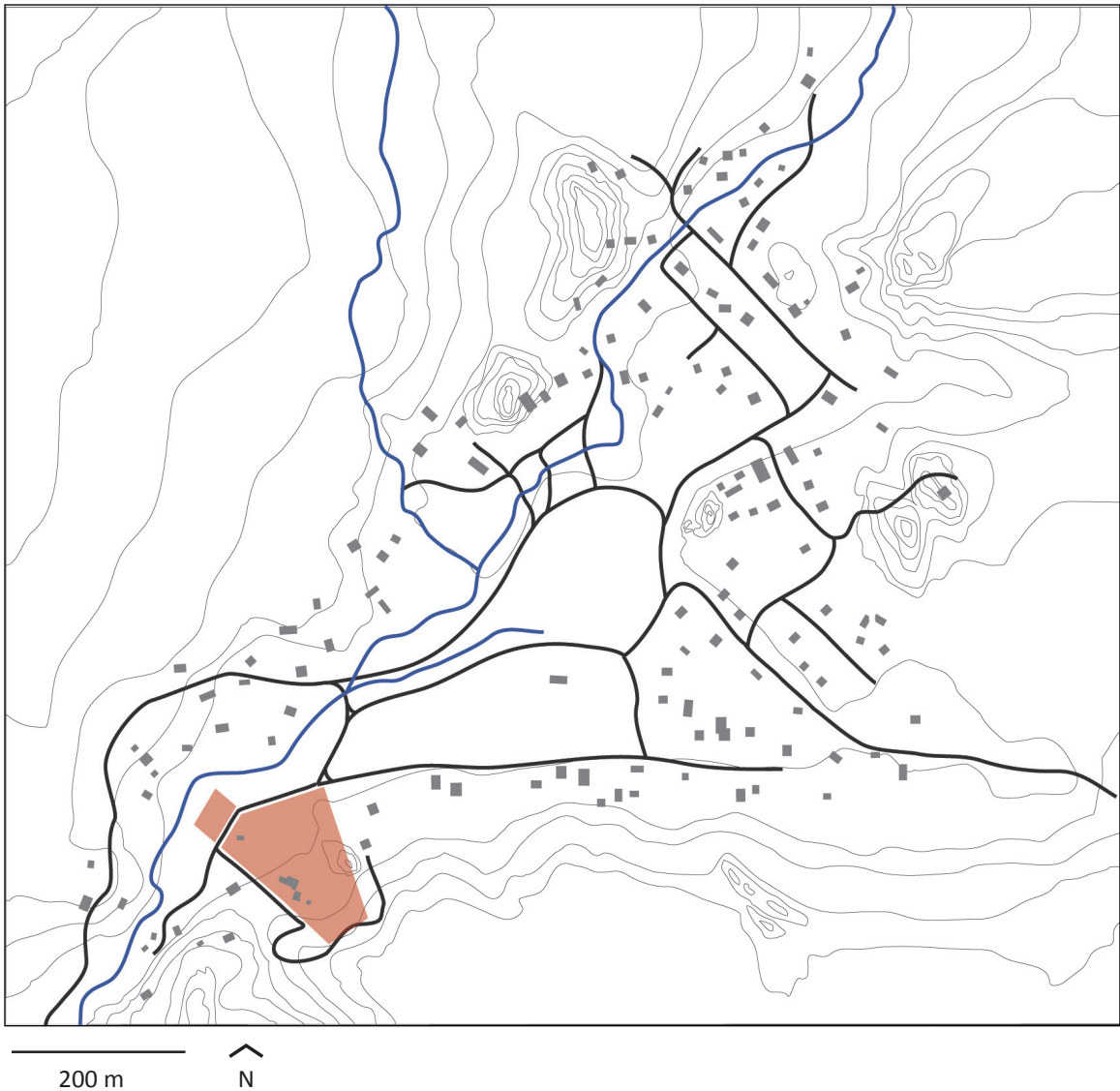
[Figure 53] Park Boundaries

There were four small towns that were sparsely settled before the park's formal establishment. Cumbres de Majalca was the most developed of the four towns, most property owners in this town use the lots as vacations homes. Ejido Soledad is located just west of Cumbres de Majalca with approximately twenty homes in the community, existing of mostly laborers and farmers. Nuevo Majalca is the first town that is passed along the road that leads to the summits. Its community also encompasses approximately twenty homes with families who work farming or other labor intensive work in the area. Guerachic is the smallest of the towns with less than a dozen homes of farmers, maids and other labor intensive jobs. Through government assistance these homes are provided with maintenance, for things like paint for their homes and solar energy.

The site for potential development is located in the largest town of Cumbres de Majalca. Since other owners in the area use their private homes for vacationing, it seems appropriate to provide accommodations options to the public. The site is located on the southwestern quadrant of the town, shown in figure 54, connected to the community space along an east-west axis through the park. The highest concentrations of private homes are located in the northern half of the town. The importance of controlled isolation and community connection are both elements that need to be considered in the design. The individual units are encouraged to have private qualities that promote relaxation and a retreat. While the mission of the Ecolodge should benefit the community as a whole through community connection, interaction and education.

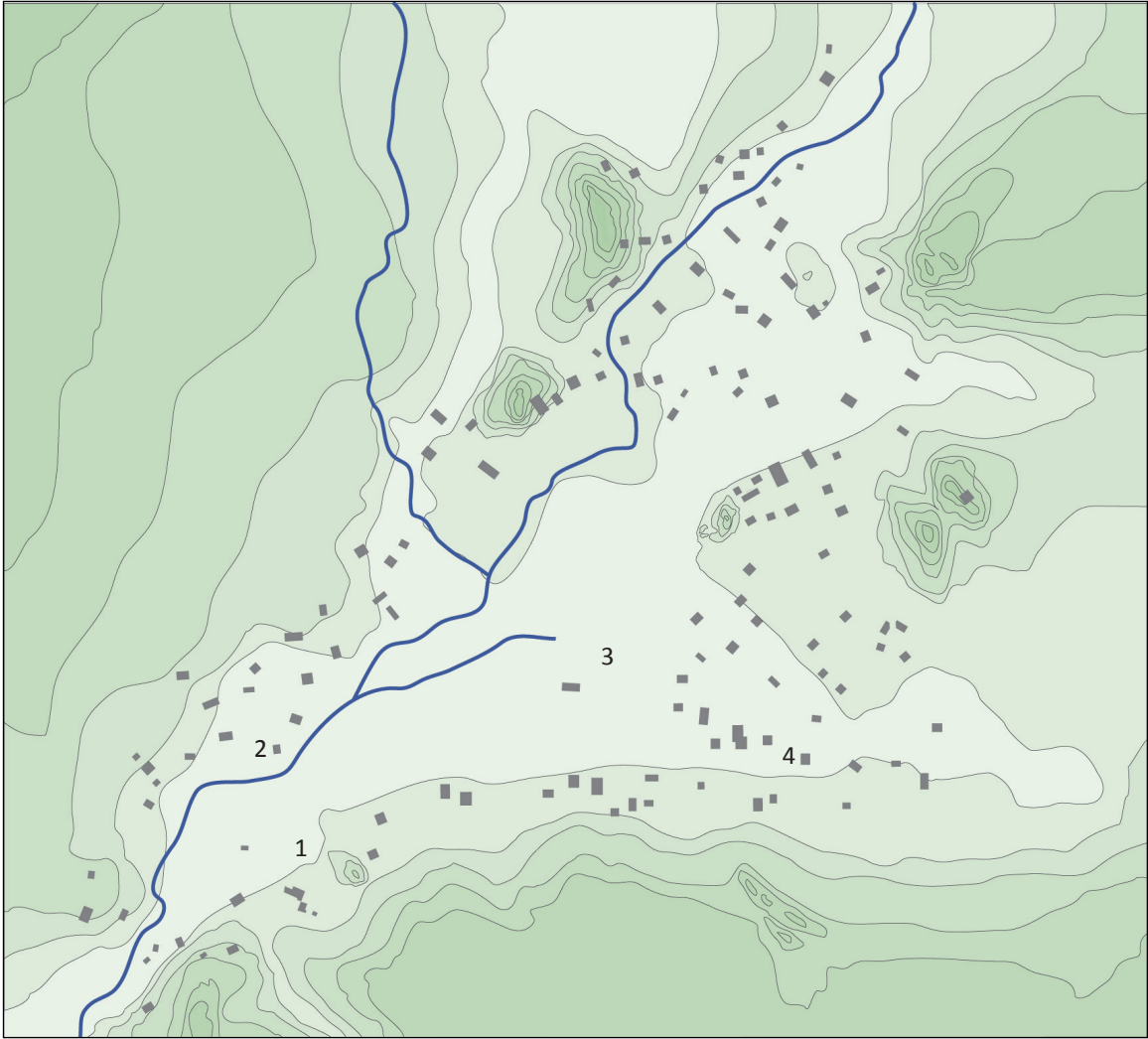
Physical Features

The reason the site for Cumbres de Majalca was originally chosen as a desired destination for settlement was because of it is relatively flat valley located among the undulating terrain, shown in figure 55. The journey up the steep mountain through the dirt road with switch backs from Chihuahua reach the top of the plateau as a refuge stop. Physically the town is centered around the relatively flat area while homes were constructed on the periphery of this area, figure 56 are photographs of this terrain.



[Figure 54] Site Location in Colonia Majalca

Early planning left the center of the valley free from potential lot owners because they wanted to keep it as a communal area for everyone to join and enjoy the landscape. Having homes constructed on the periphery is beneficiary for its view quarters. Having the homes raised up above the valley frames view to look over the communal space and reinforces its importance conceptually and physically, shown in the panoramic photograph in figure 57. Additionally the gradual elevation changes provides similar benefits as an amphitheater would, the homes views of higher in elevation can generally see over the homes below them.



[Figure 55] Physical Features



[Figure 56] Photos of Terrain

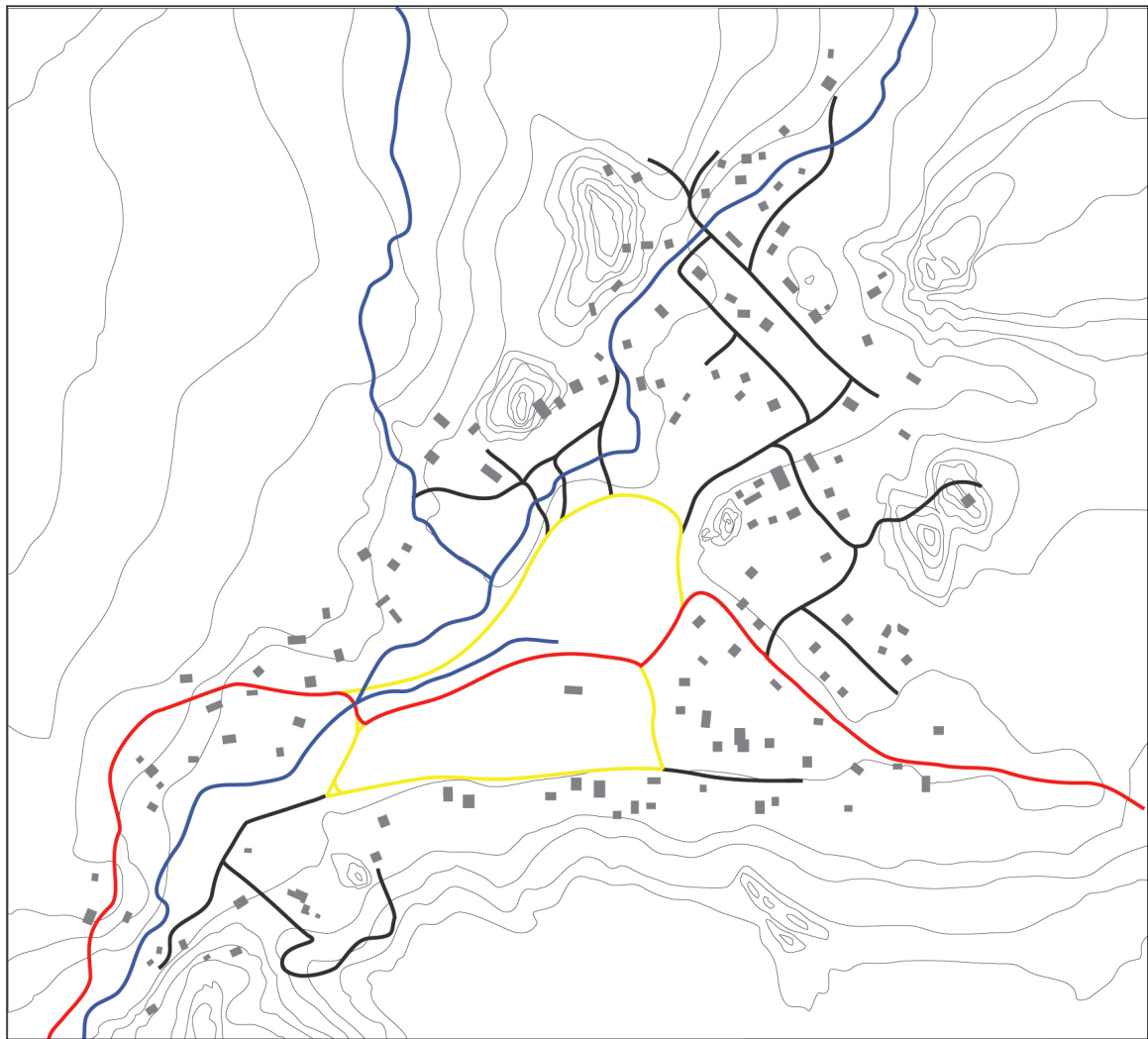


[Figure 57] Panoramic View

The original water source is natural spring located in the center of the valley. It has been supplying the community with clean, drinkable water since its first settlement. All water was once utilized from the spring or pumped into cisterns from the rivers. Natural difficulties like flash floods often disturbed the sediment in the river as well as periods of drought that would leave a very limited source of water. As rivers approach the town they widen causing the water to slow and create large pools that normally run as a small stream throughout the rest of the year. Because there is periodic flooding, homes are built away from the flood zone or on higher elevation, creating natural canal like spaces. Obvious as difficulties began to arise as more people began settling there, formed more pollution in the water from animals, vehicles and laundry. Now some property owners have dug their own wells to have fresh water directly pumped in to their homes.

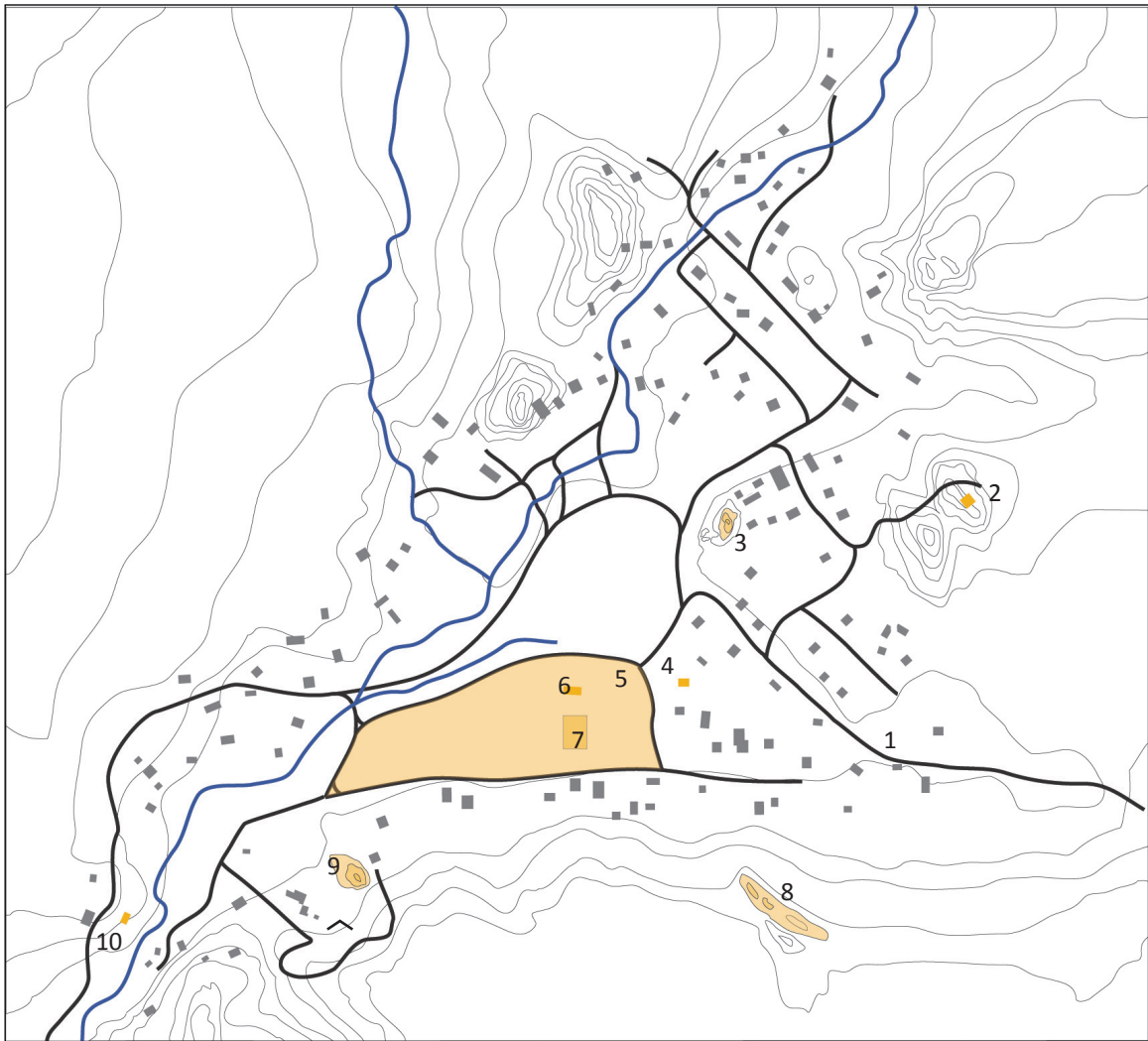
Vehicular Circulation

The 33 kilometer drive from the main highway enters the town from the southeast side of the town and leads past important landmarks and out toward the west. Figure 58, shows the circulation paths for all people coming or leaving Majalca. The road leading out of town on the west leads to two other towns in the National Park and beyond to privately owned ranches and unclaimed land. Secondary roads help define the preserved public areas that are used as community spaces. Beyond these roads continue into tertiary corridors used by residents to get to their homes. All roads with in Majalca are dirt with a few reinforcements in concrete along river crossings. These concrete section are to prevent the road from washing away during a flash flood or people's cars getting stuck while crossing in the water.



[Figure 58] Vehicular Circulation

The road organization is extremely organic based on the physical features that originally sculpted it. It follows the contours along the opening of the flat summit and continues along to the natural spring and the stream that runs from it. The original lot map defines the circulation as much more strait than they are now between the property lines. Due to water drainage based on the micro contouring of the land the roads are less strait than originally depicted.



200 m N

KEY	
1. Entrance	6. Community Center
2. Church	7. Soccer Court
3. Penon	8. Ridge Lookout
4. Compa (Small Store)	9. Tres Cochinitos (Three Little Pigs)
5. Park	10. Compa (Small Store)

[Figure 59] Places of Interest

Places of Interest

Based on the procession of arrival into Majalca there are specific areas that are highlighted in figure 59 are landmarks or nodes that are important to the community. An archway marking the beginning of town frames the main entrance. This constructed archway is accompanied with large trees that also help frame and contribute to the significance of the entry. After entering glimpses of the church can be seen between the



[Figure 60] Places of Interest Photographs

trees and homes on the hill above. The church holds important community events and services during the holidays and during the summer when the majority of families are using their vacation homes.

The next important landmark is called the Peñón, a term used for Spanish island forts where a small piece of land juts out from the water with the building perched above. Figure 60, number 3, is a photograph of the landmark feature that earns its name for its predominance in the landscape. The large rock formation was sculpted from wind erosion, standing 15 meters from the flat land below. The image of the rock is a distinctive identification for Majalca and draws more people into wanting to investigate the landscape further. Continuing along the main vehicular path, the another place of interest is the small community store that located facing the park. It sells basic products and provides visitor information. People gather in front of the service window to catch up with one another over a cold drink or buying their children a treat.

The park is located next to the small store in primarily flat center of the valley with many community amenities. It is the core of the society and promotes community interaction. Most amenities are located on the east side of the park close to the small store. Traditional park services like playground equipment, baseball field, volleyball/ basketball courts, soccer court, park benches, gazebo and community center are a few of the amenities that are provided in the park. The amenities encourage people to come

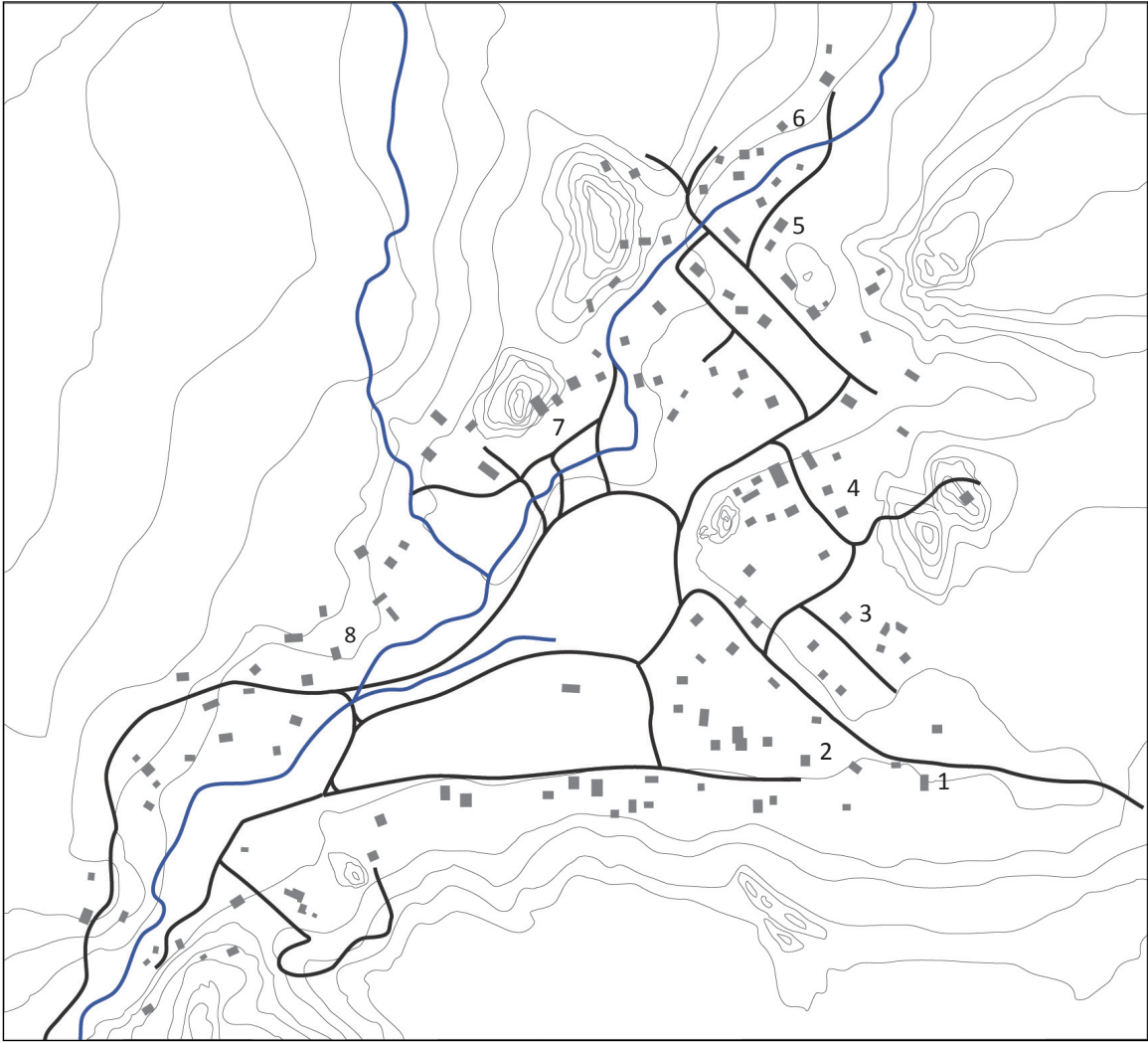
for volleyball competitions popularly held in the summer among residents and workers. It was important to the founding family to break some of cultural distinctions between classes and allow people of all classes to use the same space in order to build respect for one another. Other events that take place in the park and community center is annual summer kick off parties or main stage for events like the annual mountain bike race.


Other notable places of interest include physical features that can be climbed to provide views over the town. These mountain formations can be highly difficult to fairly easy based on the path and how far the person wants to go toward the top. The unique landscape and related outdoor activities make Majalca a one of kind destination. The rock formations create the town setting and a picturesque background for all homes. Ridge points, especially on the southern edge of town, predominantly stand out from the flat park below.

When guest are first getting acquainted with the town these are the key places in town they should experience. Each point of interest helps shed light on a particular importance in the community of Majalca. Guests should be open to outdoor activities because the whole town is based on landscape and opportunity to be away from the busy urban lifestyle.

Typology of Homes

Before taking any particular design consideration, it is very important to look at the homes that currently reside in the town. Figure 61 highlights homes ranging over 90 years from when the first home constructed in the 1920's to homes that are being completed today. The struggle it took in first building homes has become much easier with a new road constructed in the 1970's and better vehicles that can haul materials from the city to the park. The first homes were constructed over long periods of time due to the amount of construction materials an individual could bring at a time. Often each material would be brought up and used in its particular building phase before a new phase's materials were brought in. Workers who assist in building these homes are from nearby towns of Ejido Soledad or Guerachic.



200 m  N



[Figure 61] Typology of Neighboring Homes

The first designs were built using very simple building materials and techniques. Most of these homes were modest one-story buildings made from mud, stone and wood. Initially the majority of the building materials were found on site with as little materials as possible brought from town. Windows, doors, plumbing and all other specific building materials were brought from Chihuahua.

When the new road was carved from the mountainside the opportunity to commute back and forth from the city of Chihuahua became much easier. The mountain route improved the travel conditions because it no longer followed the riverbed, which often got damaged due to flooding. The improvements opening up the road for more vehicular traffic, the more consistent conditions allows for most durable two-wheel drive vehicles can now navigate up to the summit instead of only four-wheel drive vehicles. These improvements helped speed up the rate of construction and liberty to choose different materials because the journey is not as difficult so bringing materials could be more frequent and carry heavier loads.

After the construction of the new road and conscientious environmental preservation efforts, more building materials are being brought up from nearby urban centers in an effort to save the natural environment. Less materials are being consumed from the surrounding environment and more are being brought from the city. Some current housing projects have even hired a full time carpenter equip with a full workshop powered by solar and generators to take materials from the city create everything custom. The money and time put into homes are much more elaborate than they once were because families are finding how valuable the land and experience is in Majalca.

Families who are investing money into improving or rebuilding their homes are increasing the overall value of the land. The value of the land is not only monetary but the experiential. Founding families who have valued their experiences in Majalca are now passing the torch. Whether to their children who equally value the land and experiences or selling to people who have visited and equally see the value. When



[Figure 62] Typology of Neighboring Homes

the area became a national park in 1927, only the existing purchased lots were grandfathered into the park as private property. People who are looking to purchase land need to wait until a property owner is ready to sell or split their lots. Usually it takes an important connection to the community through relation or frequency of visitation until someone is ready to sell.

The building and family typologies are not the only important components that are characteristic of homes in Majalca. The connection to the outdoors is incredibly important because of the environmental setting, photographs support this aspect in figure 62. Outdoor spaces are used as gathering areas, dining and relaxation. Over the years the outdoor spaces have become increasingly important as family and community gathering areas. Not only are these areas used as a dining or sitting areas they can extend to outdoor kitchens equip with grills, rotisseries, ovens, sinks, and ample space for serving. These spaces have become more popular among residents because it reinforces the environment their located.

Originally, construction did not encourage the connection between indoor to outdoor spaces. The separation between each space and the way people used them made it obvious that outdoor spaces more popular. Their organic transformations of outdoor space reflected what residents actually wanted and felt right in the landscape. From an architectural perspective, it has always been a goal to incorporate building design with the existing or fabricated landscape. Since the landscape is unique in

Cumbres de Majalca, typical building design and construction may not be the most appropriate answer in Majalca. Current patterns of use can only be indicators of how future development can be transformed in the future.

Chapter Ten

PROGRAM

Community Improvement

As part of the ecolodge development, a community improvement project should be incorporated to gain the neighborhood support and create connections between neighborhood and ecolodge development. Strengthening these connections between the future development and existing community will create a bond that fortifies the two components. Not only will the connection make guests feel more welcome into the community but the current owners will also be more perceptive to interacting with guests. The connection between residents and guests will be an important component for understanding the existing expectations toward the environment and culture. The anticipation is to educate guests so they can find the same enjoyment and appreciation that residents have for Cumbres de Majalca.

Park area has been the core communal space in Cumbres de Majalca and has been preserved since it was first settled the middle of the flat valley. The existing amenities in the park are primarily located near the east side close to the small store. These amenities include; park equipment, a baseball field, soccer court, volleyball/ basketball court, park benches, Sun Dial, gazebo, and a walking path through the park. People have been gathering here for decades to socialize with one another and have friendly interaction. As part of the ecolodge development, improvements should be



[Figure 63] Existing Park Entrance



[Figure 64] Existing Park Features

made to the park to better attract and benefit the community as a whole. Making improvements in the park will help integrate the ecolodge into the community and strengthen its connection.

Making use of the whole park by creating connections throughout the length of the space would make better use of the area and forge a connection to the ecolodge site. There are many important interventions that can be made through landscape design, placement of entrances and exits and location of amenities that can create a place where people can continue to gather for years to come. Through important site analysis and important design aspects revealed through cultural research the connection can be forged between the park and ecolodge. Improvements to the park will also enhance the potential for future events and expanding existing events such as the bike race into the area.

Ecolodge

The program for the ecolodge will extend from the community intervention into semi public spaces such as the main lodge facilities with dining services and guest information. As well as the managing family’s amenities located on site. Other semi-public spaces include an outside gathering area with space for dining, dancing, bonfires

COMMUNITY IMPROVEMENT PROGRAM

<i>Existing:</i>	<i>Proposed:</i>
Community Center	Walking/Running Path
Soccer Court	Frisbee Golf
Gazebo	Reorient Amenities
Sun Dial	Additional Entries
3 Stone Entries	New Fencing
Baseball Field	Picnic Tables
Volleyball/Basketball Courts	Grills
Playground Equipment	Reforestation

[Chart 10] Community Improvement Changes



[Figure 65] Improved Features

<i>Existing:</i>			
Main House	140 m ²	6 people	6 people
Maids House	75 m ²	4 people	4 people
Casita	37 m ²	2 people	2 people
	252 m ²		12 people
<i>Proposed:</i>			
Bunk House	78 m ²	8 people	8 people
Family	52 m ²	4 people	4 people
Casita [8 units]	41 m ²	2 people	16 people
	458 m ² +		26 people
Total Capacity:			40 people
ATV Storage	282 m ²	40 ATV	
Kitchen	40 m ²		
Dining Room	60 m ²	40 seats	
Lobby/Lounge	117 m ²		
Manager Facilities	41 m ²	2 people	
Outdoor Spaces	150 m ²		

[Chart 11] Ecolodge Program



[Figure 66] Existing Building

and stargazing (approximately 300 square meters). To prevent noise pollution close to the individual units it would wise to also place the ATV storage and maintenance in this transition area (250 square meters). These spaces are meant for the guests to get to know one another during their stay and learn about all the opportunities they have while staying up in Majalca. Community residents or those who come to camp can enter these spaces if they invited by guests. This space can be considered a transition from public to private spaces in the town. The transition space allows the guest to feel safer by having their unit feel more exclusive and relaxing.

The existing structures that are on site are the main house that accommodates 8 people, a structure that was once the maids quarters can comfortably house 4 people, and the small casita that holds 2 people. In addition to the existing 14 person capacity there will be additional development for 26 additional people. Future development on private spaces on site at the ecolodge include 7 additional single bed units (14 people),

another double bed unit (4 people) and a large bunking house for 8 people, all equipped with an outdoor gathering space. Each unit is expected to fulfill certain physical and experiential expectations from the guests. Each unit would have a private bathroom per unit with a sitting area. These units should give guests the opportunity to relax and soak in the surrounding environment. By being more exclusive, private and quiet the guests will be able to enjoy their retreat from the city and immerse themselves in nature.

Important amenities that will be located off site would be the horse stables and staff housing. The horse stables need more space for training and stables where staff can watch over them at all times. It is not only better for the horses to have full time caretakers but it is also important to keep unsavory components such as the smell from the stables away from guests relaxing experience. To encourage employment from the local community their housing facilities can continue to be in a nearby town where the government has provided money toward solar water pumps and construction of new homes.

Chapter Eleven

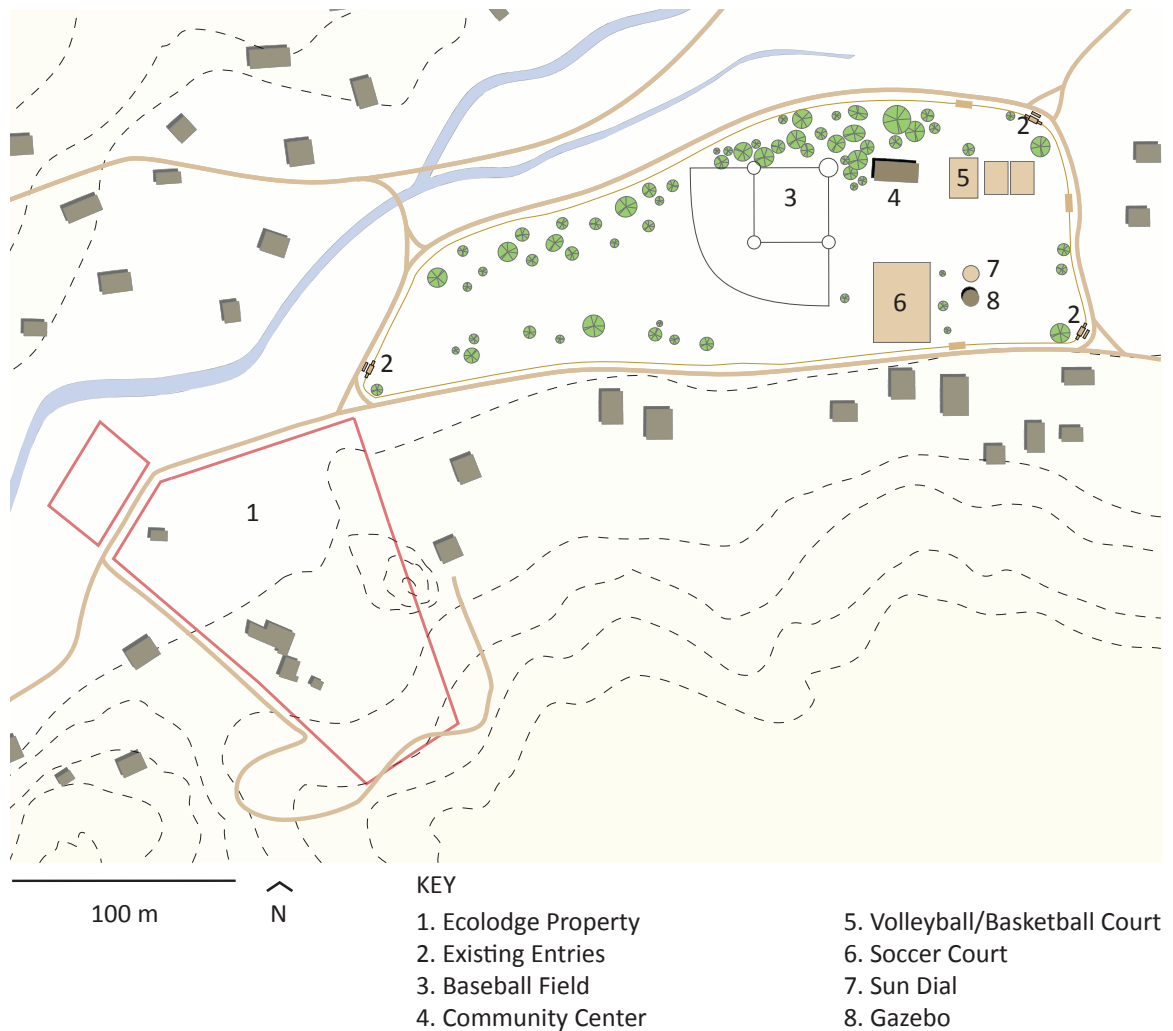
COMMUNITY IMPROVEMENT

Park Improvements are based on a reorganization of spaces to help utilize the entire space and create connection from the ecolodge site into the community. The proposed changes are based on a geometric pattern inspired by ceramic designs found at the Casas Grandes ruins. Most panels were historically divided into two triangles or diamonds and then designed further into intricate black lined designs.¹⁰⁸ Not only does the geometric pattern serve as a physical inspiration but just as the symbol of duality is mimicked in the similar duality between community interaction and private retreat. The balance between the two sides is important for both halves to thrive.

Three existing stone entrances will remain in their original locations while two informal entries will be relocated to better service the length of the park and follow the geometric pattern. Spreading the entrances through out the length of the park will allow easier access for ecolodge guests and residents in all directions. easier access will increase the amount of people who will use the facilities. These entrances will be connected by paths following the geometric design to enhance connectivity between one another and extending to the community beyond.

The existing conditions that need to be improved through out the whole park should include new fencing around the perimeter, playground equipment, picnic tables and grills. New fencing to replace the existing barbwire is for aesthetic reasons as well as accessibility. Barbwire is uninviting to visitors and often subliminally reads as not welcoming. Replacing the fencing with a stone and wood fencing option will more encouraging for park users and keep the area free from cattle. With more traffic passing through the park it will become a larger hub for interaction. Playground equipment picnic tables and grills can be placed along these paths to encourage people to stay longer in the park.

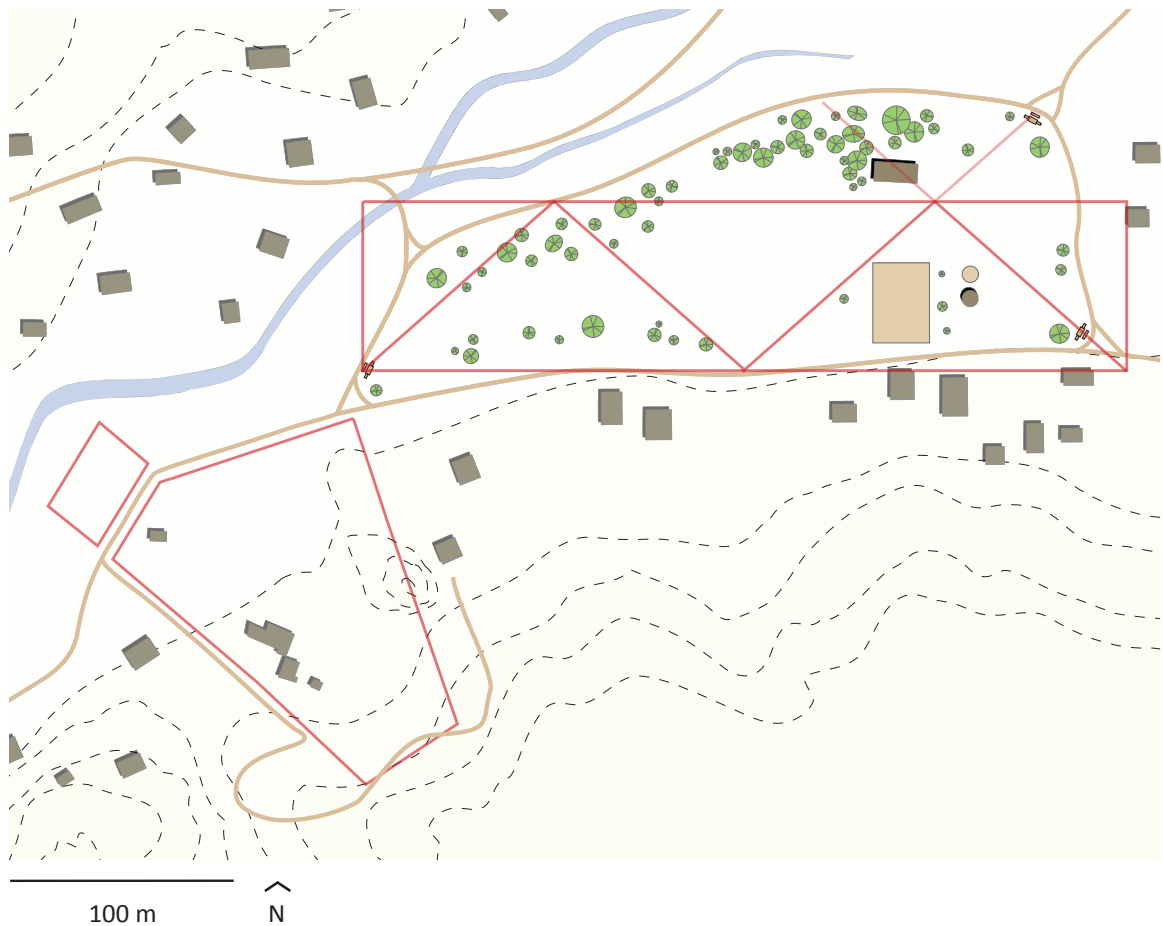
108 Stuhr, Joanne, and Eduardo Carrera. *Talking birds, plumed serpents and painted women: the ceramics of Casas Grandes = Pajaros hablando, serpientes emplumadas y mujeres pintadas: la ceramica de Casas Grandes*. Tucson, AZ: Tucson Museum of Art., 2002.



[Figure 67] Existing Park Conditions

The community center, soccer court, sun dial and gazebo are existing constructions would remain in their original location. The cost to relocate the community center does not outweigh the benefits of moving it off the geometric design guide. Instead it stands near the intersection between four entrances creating an important community node. The soccer court, sun dial and gazebo will also remain in the same place, however these fall neatly into the designed geometry.

Relocation of the baseball field will help reinforce the geometry and improve the playing conditions. The triangular shape of the field naturally fits into the prescribed geometry and optimizes the full day use of the field. Orienting the field north to south will work with sun angles to give the batter a north facing direction and neither favors

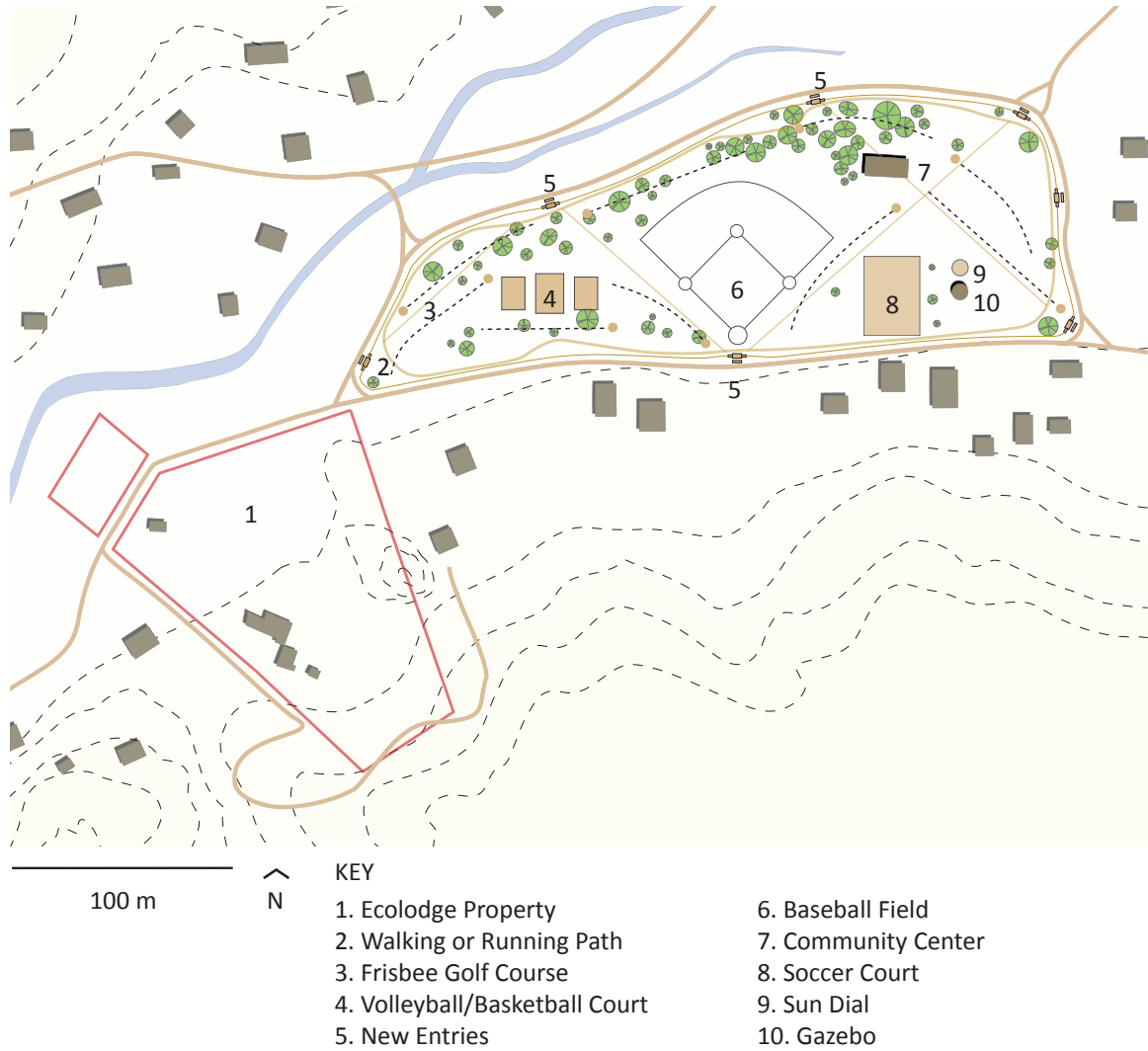


[Figure 68] Reorganization of Park

morning or evening games. Despite the varying orientations, there are several fields oriented in the north south direction including Arizona Diamondbacks and Colorado Rockies. The 2012 Major League Baseball rules officially prescribes the batter to face northeast due to more frequent evening games but is frequently waived when following other rules.¹⁰⁹

Existing outdoor volleyball and basketball courts will be relocated to the west side of the park to help spread activity through the length of the park. These playing surfaces will also be oriented north to south, like the baseball field. The overall changes in the parks structure results in each of the three triangles catering to a particular sport. Organizing park functions through out the park helps forge the east to west axis with

109 "Baseball Orientations in the American League." Baseball Almanac. http://www.baseball-almanac.com/stadium/ballpark_NSEW_AL.shtml (accessed February 27, 2012).



[Figure 69] Park Improvements

volleyball/basketball courts in the west triangle, baseball field in the center and soccer in the east triangle.

Other key components in utilizing the full park potential are the walking or running path and the frisbee golf course. The walking path will follow the perimeter of the park and will have a material indication of the path. This course will help promote a healthy lifestyle and a smooth surface for measured running path. The frisbee golf course meanders along both the walking path and the direct connection among entry ways. In line with 9 hole frisbee golf rules there are three tees to each the left, right and strait. The length of these holes will vary between 180-300' (convert to meters) . Holes

under 200' will be a par 3, 200-250' are par 4 and 250'+ are par 5.¹¹⁰

Improving park conditions will result in better and more frequent use of the park space. This improvement reinforces the original layout of the town by returning attention to the central community space. Diverse amenities for play and relaxation through out the park will result in more activity and community interaction. The more the park is utilized by the residents to improve their contribution in establishing a unified community. Interaction among residents helps to break down the boundaries of private space. It is much easier to approach a person in a park than in their private home.

110 Ed, Steady. "Designing Disc Golf Courses." Disc Golf Association | DGA | Home of Disc Golf. <http://www.discgolf.com/course-design/course-designing-basics.html> (accessed February 26, 2012).

Chapter Twelve

SITE ANALYSIS

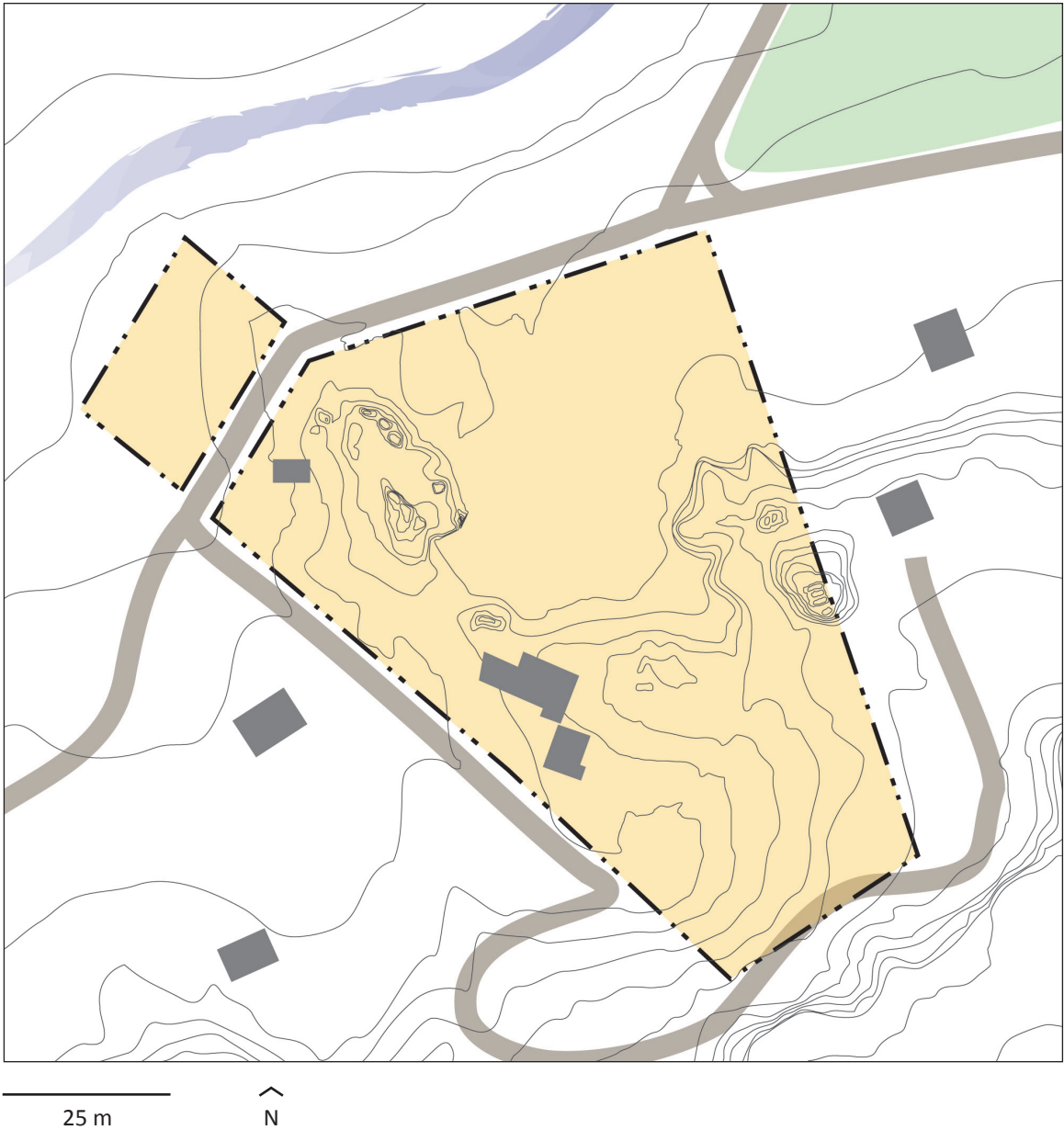
To better understand the site's existing conditions a series of diagrams were generated to better understand orientation for the site, the complex topography, the overall character of the landscape, developable land, sun angle's impact, vehicular and pedestrian circulation, and lastly views on the property. Each aspect helps highlight particular features that can be influential in design. Using the information from the following categories helps unfamiliar guests understand the conditions and leads the design to its fullest potential.

Orientation

The site for the proposed ecolodge is located at the end of the east-west axis of the park. The continuation of this axis is an important component to connecting the ecolodge back to the existing community. The significance of the ecolodge is not confined to the on site accommodations but should have a mission to serve the community, educate the guests about the surrounding environment, and treat the environment responsibly. The existing community can be the best examples to show how guests should treat the environment because they have years of experience and knowledge of the surrounding area.

The property is located off a secondary road that encircles the park. There is limited access of a tertiary road that passes through the property however the road is a dead end with very few homes located beyond the property. This dead end creates a more private experience for guests during their stay, which correlates with some of the tourist expectations during their vacation experience. Guest expectations are to feel relaxed in a retreat enveloped in the surrounding environment.

Figure 70 illustrates the existing property lines for the site which encompass 15,325 square meters, a division created by a road easement is required on site to allow for property owners beyond the property to access their land. The private road, located on the southern boundary of the property, is built by the adjacent property owners and



[Figure 70] Site Orientation

partially cuts through the southwest boundary of the existing property lines but has yet to be a problem.

Topography

Figure 71 illustrates geographic features on the site vary 32 meters of elevation from the river boundary to the northwest to the ridge southeast of the property. Generally the landscape has a predominantly flat area in the northeast corner, currently



[Figure 71] Topography

used as an orchard. Within the property lines there are two prominent landscape features that stand out, the remaining landscape undulates throughout the property. Dramatic changes in elevation create design challenges that can promote unique architectural solutions with the landscape.

Landscape Character

There are four distinctive landscape characteristics in figure 72 that break up



[Figure 72] Landscape Features

the existing property. the northern edge is primarily flat land adjacent to the river. Surrounding the flat area are two distinctive landscape features that jut out of from the flat land with large sculptural rocks, this area creates dramatic changes and can be defined as cliff side. Between these two predominant features is a connecting ridge line. Beyond the ridge the elevation maintains a gentle upward slope and creates a bowl like

feature.

Figure Ground

Due to the extreme changes in elevation on site, it was important to evaluate what parts of the property are available for development. Creating a simple figure ground diagram, in figure 73, helps illustrate which parts of the property and surrounding area are limited in their development. The 15, 325 square meters of property, 1,790 square meters, 11.5% is not developable due to the steep landscape. The deficiency in developable land makes it a challenge to fit all the programmed spaces within the property lines.

The negative space also highlights where the most predominant landscape features on the site. Such steep changes in elevation are one of the initial draws for guests visiting the park and this site has two special features to showcase. Illustrating the landscape as positive and negative makes it clear on the proportion of land that is able to build on.

Sun Path

Early evaluations of how the sun's direction effects the future orientation of buildings on the site. Figure 74 considers the position of the sun as the first step in making spaces more comfortable to guests. Northern facing glazing in structures will have the best indirect lighting qualities and create a place that is enjoyable and can connect to outdoor spaces. Orientation and materiality of the structures will make a huge difference in the interior spaces climate control, if designed correctly there will be no need for electrical heating or cooling systems.

Access and Circulation

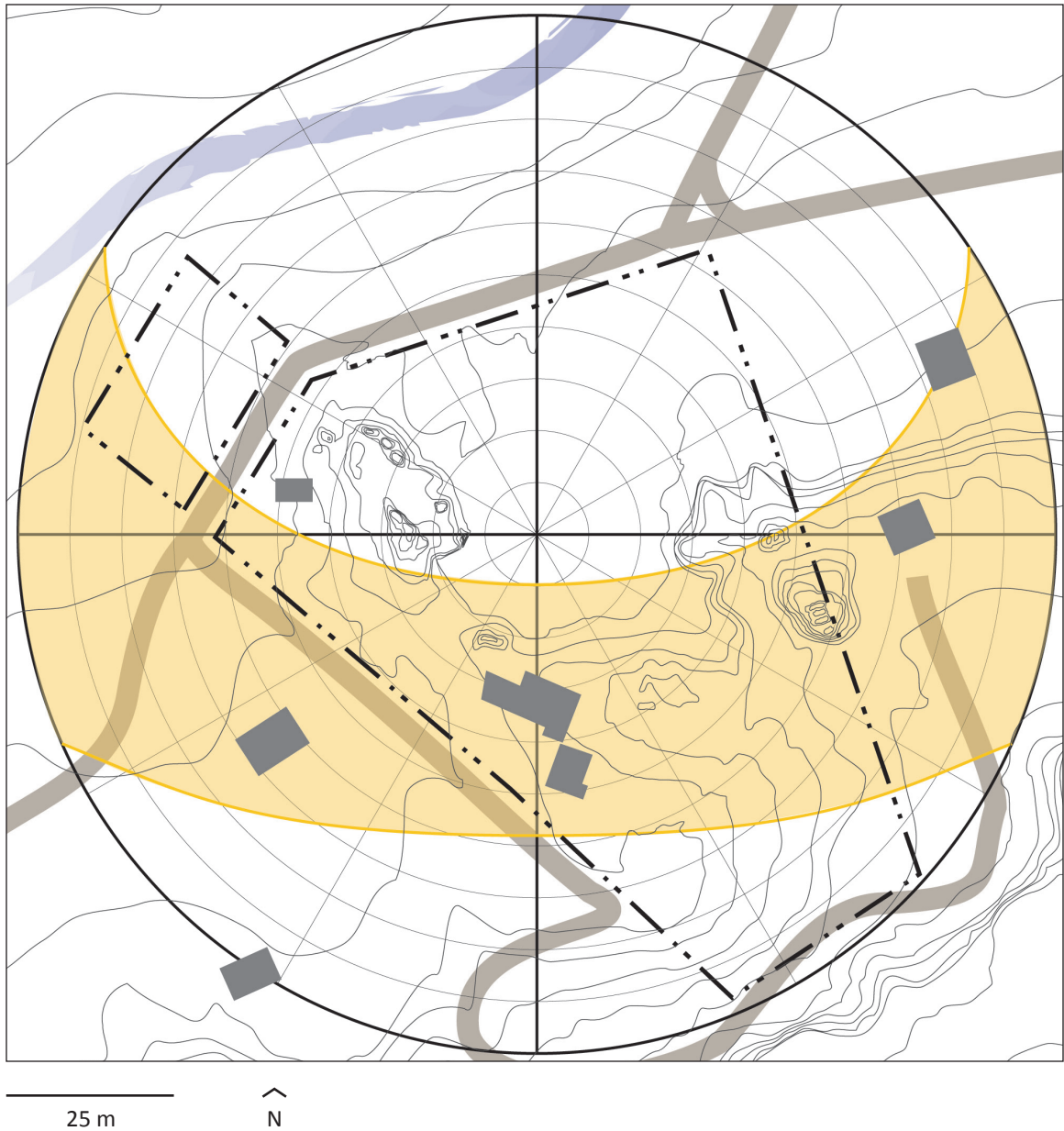
Current access points to the main house on site is made through the front, via the orchard entrance on the northeast face of the building demonstrated in figure 75. The entrance is located just off the secondary road that circles the park. The gate opens up to a narrow lot filled with trees, one must go through an additional portal between the walls and through the orchard to reach the bottom of the hill. From here one can



[Figure 73] Figure Ground

either use the stairs, north of the front door, or the ramp access east of the front door. The back entrance is accessed from the small road that connects to the secondary road. The road hugs the property line until it turns into a private road that is gated by its property owner. The back entrance of the main house is also access by stairs carved from the stone and partially constructed from wood.

Using natural landscape features and constructed walls, cows and horses are kept

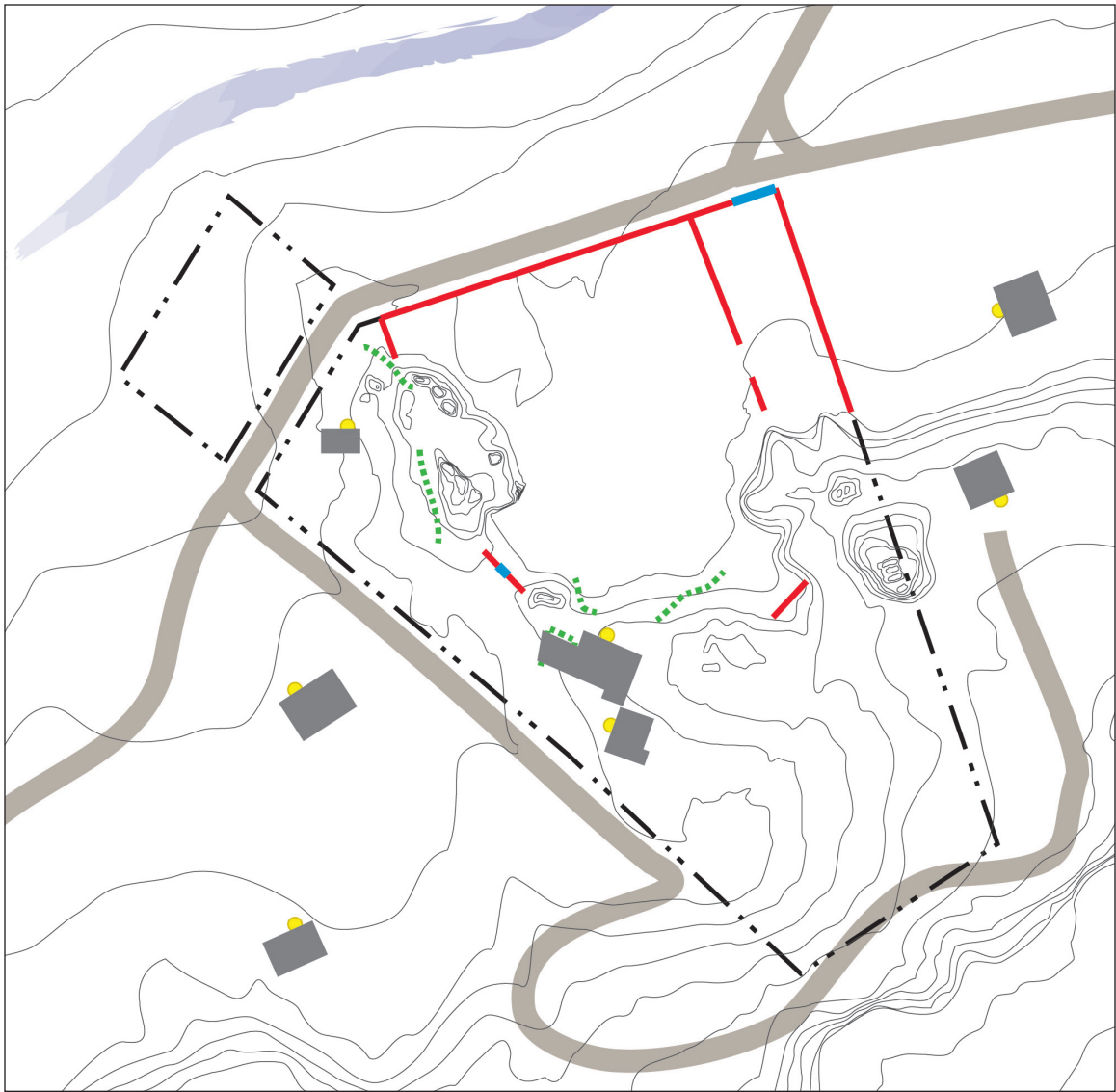


[Figure 74] Sun Path Diagram

out of the flat orchard area below the main house. It is common throughout the town to fence off their property and can be due of animals however these walls have qualities that indicate Spanish influence.

Property Views

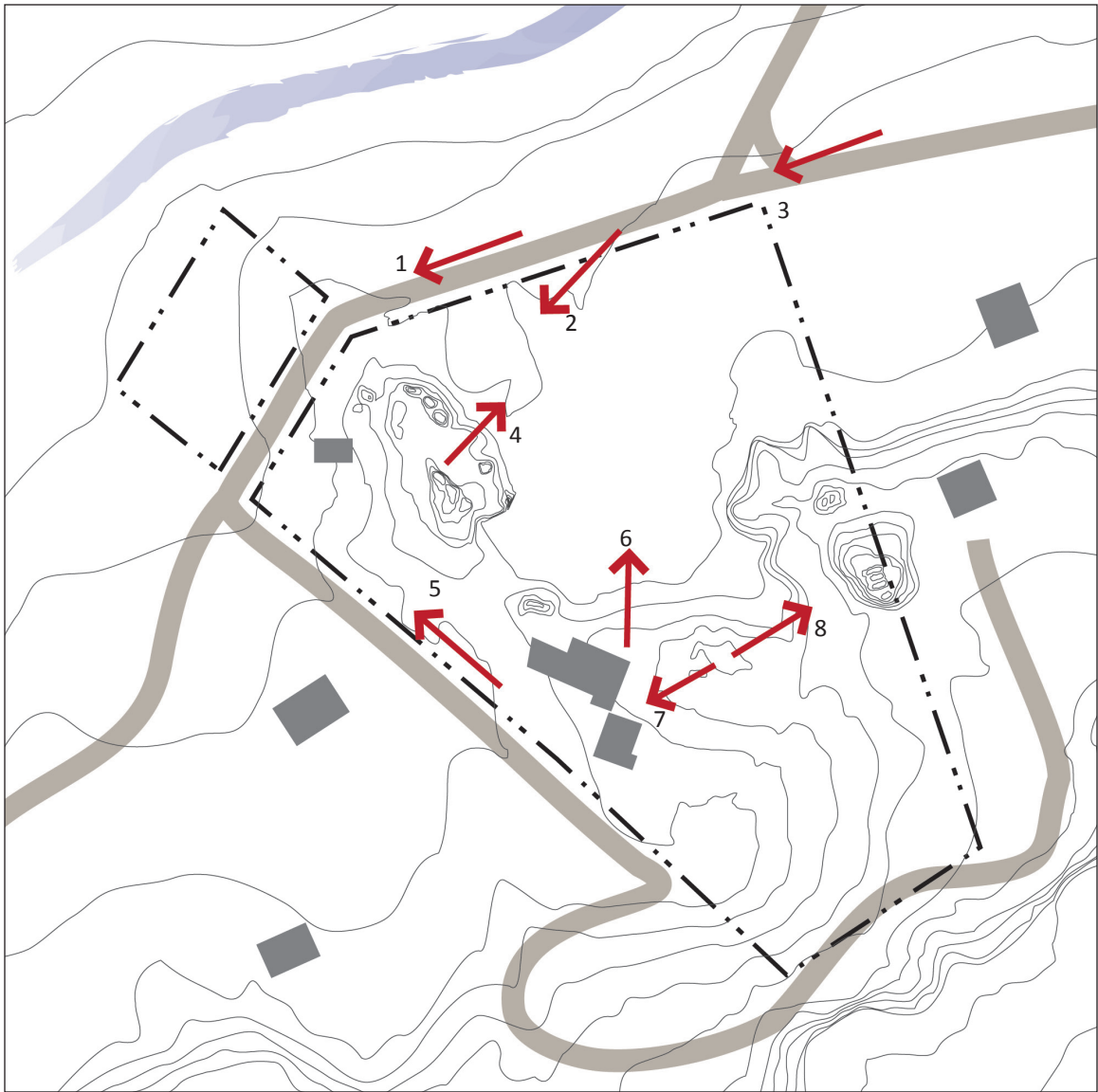
The dramatic landscape makes for nearly 360 degree views depending on the specific location on the property. Each landscape feature provides a new perspective



[Figure 75] Property Access and Circulation



[Figure 76] Photos of access and circulation



[Figure 77] Views on the Property

of the environment and creates a very different atmosphere. Figure 76 illustrates the direction of the coordinating photographs in figure 77. The arrows point in various directions to give the best depiction of site characteristics and possibilities for particular siting for building placement.

The river, to the north, is a distinctive feature worth framing views toward, especially worthy during rainy season when it is flowing generously. Views up to the rock



[Figure 78] Views Photographs

formations like the 'Three Little Pigs' are also key in potential location of rooms. Over all there are two main connections that should be continually reinforced; the ridge to river connection and the property to the community park connection. The connection to the community integrates the guests into the existing dynamics among families who have vacationed in the area for more than three generations. The environmental connection is important because it helps fulfill the tourist expectations and reinforces the connection to the land.

Chapter Thirteen

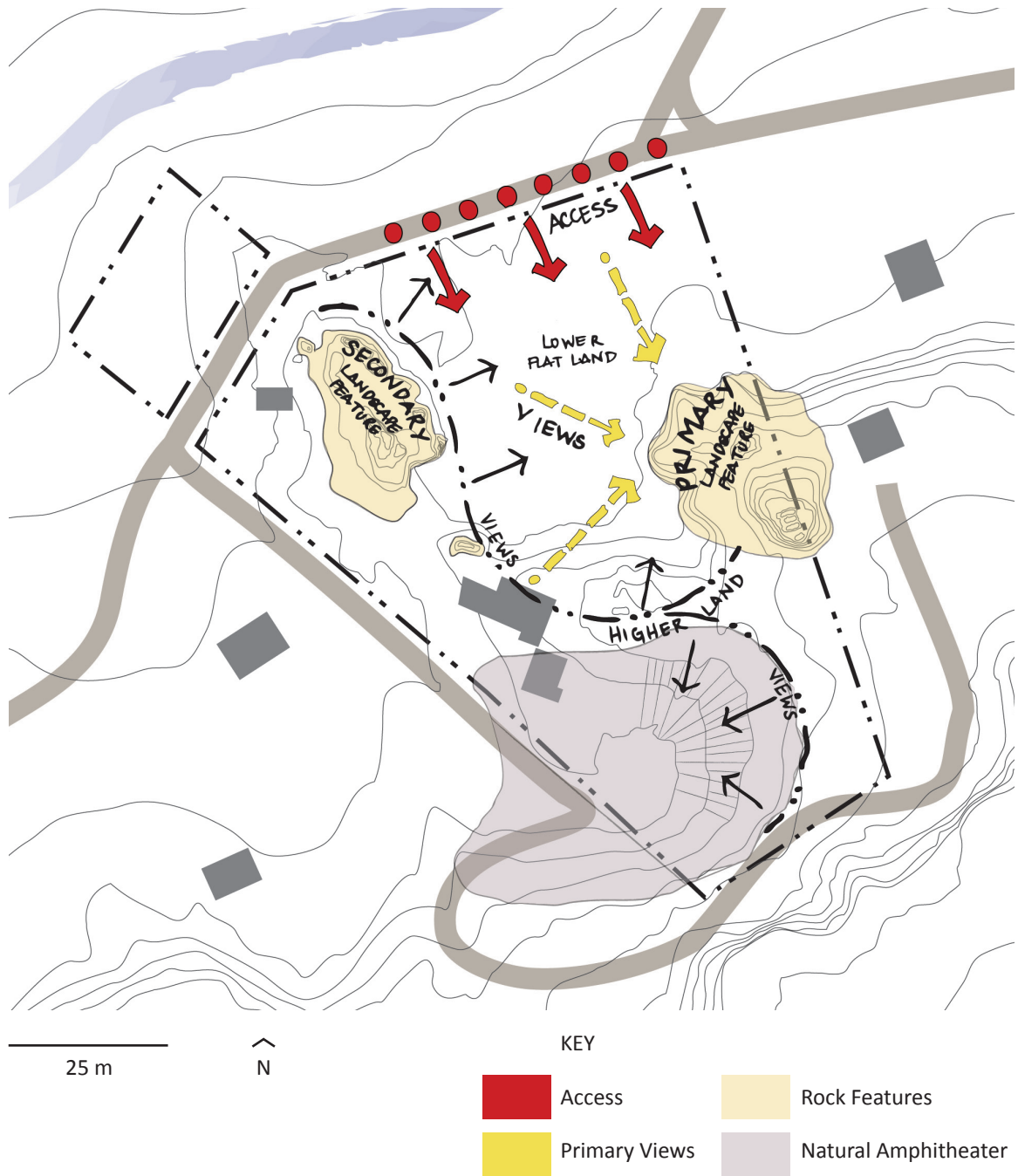
DESIGN GUIDELINES

Opportunities and Constraints

Based on the study from the site analysis and research documentation there are features that reveal particular design solutions for the project. Interpreting information about site orientation, topography, landscape features, figure ground, sun path diagram, views and property access and circulation diagrams help indicate future actions. Design starts by eliminating all preexisting ideas and looking at just the information derived from the diagrams.

Figure 79, indicates the opportunities and constraints that guide the design. It's goal is to extract ideas from the research and depict the best or most likely solutions for the design problem. According to the information from the site orientation in figure 70, the connection to the park is important indicating the access point should be located on the north side of the property. Eliminating the existing solid wall along this boundary will open up the connection to the park and greet arriving guests with two landscape features that predominantly stand out in the topography, in figure 71. The primary landscape feature indicates the most valuable view on the site. Framing views of this feature instills the importance of the unique environment and why this destination is worth visiting. The secondary feature holds more potential for architectural interventions that integrate the natural rock features into interior spaces.

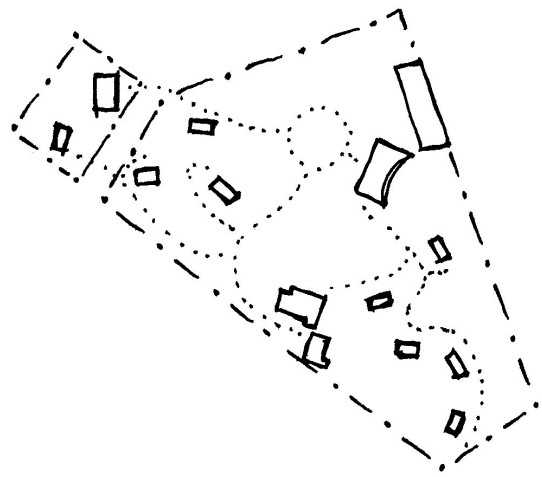
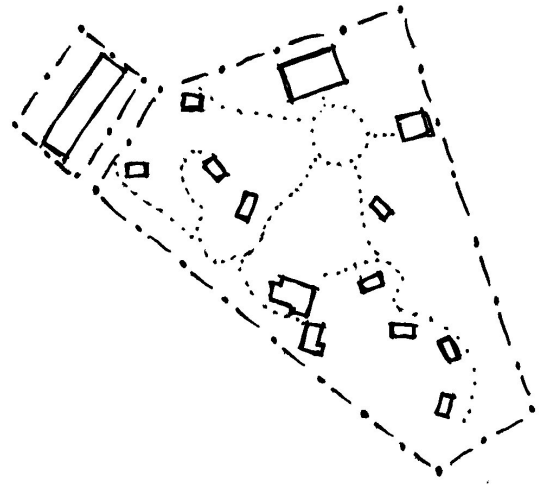
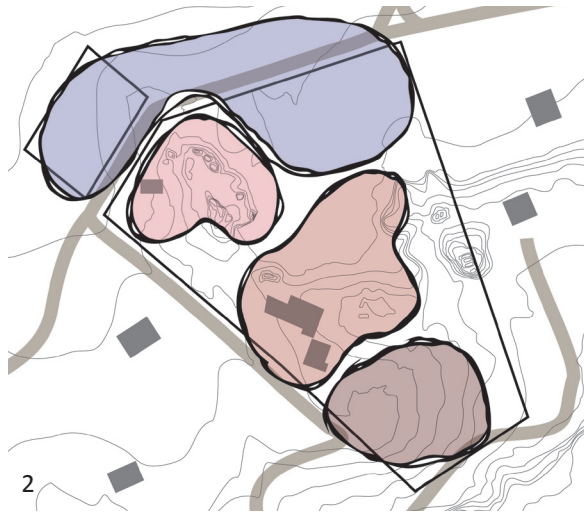
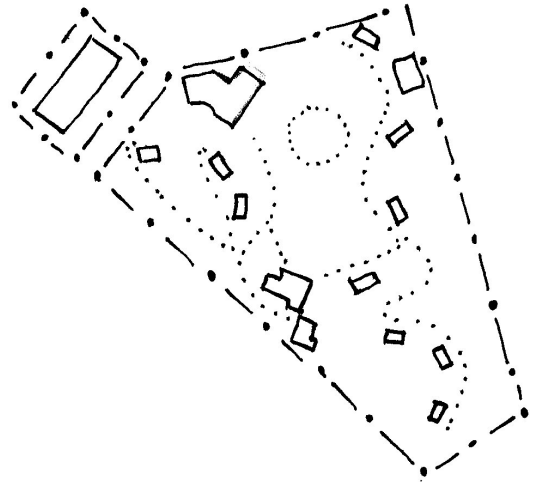
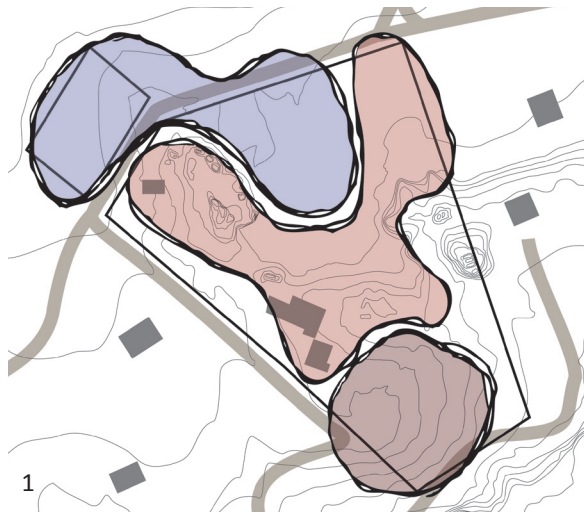
Together these features create a distinction in the site's landscape by defining the point of access as lower flat land. The ridge connecting the two features divides the site between high and low points, represented by a curved dashed line. This change in levels creates secondary views from the higher view point over the lower area. On the south side of the site there is another change in topography that represents an experience like an amphitheater. The curving landscape is similar to a bowl by creating secondary inward views. These elements create three distinct areas of possible development; lower, higher and amphitheater areas.



[Figure 79] Opportunities and Constraints

Site Organization

The reorganization of the existing park spaces and additional amenities added to the park strengthen the community interaction and forge a connection with the site located at the west end of the park. In response to this public front, near the northeast corner of the property, graphic studies, in figure 80, were conducted to gauge the general



[Figure 80] Site Organization & Building Placement

zoning of the site. The study continuously kept the most public functions on the north end of the site and then varied levels of privacy for the guest rooms. The further south and away from the park the conditions become more private.

The northeast quadrant of the site is a primarily flat apple orchard with two distinctive rock formations jutting up out of the terrain. Each scheme plays with framing views and considerations for the initial approach. The scheme number three, in figure 80, backs the main lodge space into the most predominant landscape feature. This creates a carefully nuzzled building into the rock formation as the landscape builds itself up behind it. The second scheme attempts to turn the main lodge space around to appreciate the landscape feature from the views inside the space. The zoning in this scheme keeps all operation functions along the tertiary road to create an ease in accessibility and create a layer of semi private spaces to transition from the public park space.

The scheme number one attempts to combine the ideas brought about from the other two schemes on how the space is experienced based on the approach and desired views from the interior. Shifting the main lodge space closer to the other smaller landscape feature, creates a similar spatial build up while creating the potential for interior views toward the larger rock formation across the orchard. Keeping the view quarters open to the large rock feature continues to honor the feature as the 'sacred' space or most important feature on site and should remain untouched any building interventions.

The location of the main lodge heavily effects the way the private spaces are positioned on the site by varied zones of privacy. The final scheme includes guest accommodations in the low flat area. This location provides easier accessibility to the main lodge facility and to the road. The bunk house and family unit can both utilize the ease of accessibility because guests who choose these will want to be more interactive during their stay. Spaces on the periphery of the orchard, either low or on high land, face the interior toward the orchard. Landscape features and private units help frame

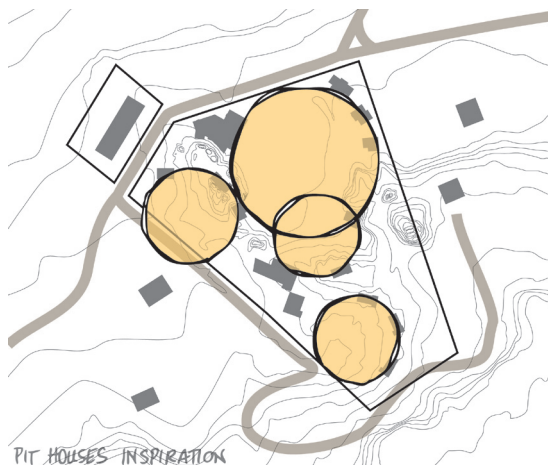
the orchard boundaries which becomes the guests communal area. The most private of spaces are the upper casitas on the south end of the property because they do not face or interact directly with the flat space at the front of the property. Being the furthest removed from community and guest interaction these units have a private oasis in their bowl like landscape.

Each of these private units are connected to the main lodge by pathways that are weave up hillsides, beside towering rocks and past views of the surrounding landscape. Each paths leads from the main lodge to the private units as a continuation of the journey. The final resting point from the journey is the guest's unit.

Cultural Influence

The journey from the base of the mountain, 33 kilometers to the summit, can symbolize the journey by trade routes once used by Aztec and Pueblo civilizations. Casas Grandes in Chihuahua was along the trade route and represented a transition point between two important civilizations. People in Casas Grandes and greater Chichimeca civilization learned valuable skills like building, ceramics from the Pueblo civilization and ball courts and astrology from the Aztecs. Preserving the cultural heritage that currently and historically exists in Chihuahua, reinforces the continual theme of transition throughout the project.

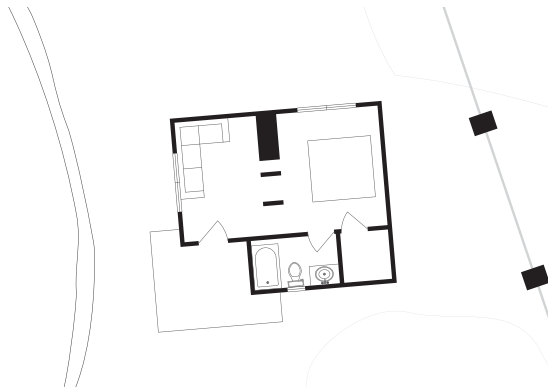
The ecolodge reflects particular elements inspired by the study of past



[Figure 81] Site Pan Layout based on Pit House Form



[Figure 82] Pit House



[Figure 83] Rectilinear forms from Casas Grandes



[Figure 84] Casas Grandes

civilizations in the region. Some of the oldest archeological finds in Chihuahua were basic pit houses, these as well with the shape of the natural contours helped inspire the layout for the private units, demonstrated in figure 81. These circular pit houses, photographed in figure 82, ranged from 25 feet to 135 feet diameter. In larger pit structures there would be interior pits that would divide the space further often with interior post holds that dictates interior walls. Each pit includes an adobe hearth to keep the space warm and symbolizes the family's spiritual core. The design follows particular arcs forms similar to pit houses and the landscape to create a communal space framed by structures. Just as pit house's circular form created a geometry for a strong roof the site design needed a structure that inspired a similar importance and strength.

The rectilinear form of the buildings in Casas Grandes region is extremely indicative of the regions architecture. The largest city in the region, Paquime, is the best example of the civilization's building forms. Many of the structures in Paquime been excavated to reveal archeological evidence about the culture's sophisticated knowledge in geometry and astrology. The design uses a similar rectilinear form in the individual units to pay tribute to the region's most influential city. The interior spaces are thoughtfully inspired by room hearths also discovered at Paquime. The individual guest units are designed with a central wood burning fireplace to represent the hearth. It serves functional purposes of heating the space as well as establishing a centralized area in the space.

Chapter Fourteen

DESIGN

Meeting Ecolodge Design Standards

Quantifying the design project in terms of the comparative parameters used in *Chapter 8: Case Studies on Ecolodges*, chart 16 give a quick overhead of the services and defining aspects of the location. The qualities defined in the chart are a way of quantifying the unique aspect the ecolodge has to offer to visitors. Similar to the six selected ecolodges, Cumbres de Majalca Ecolodge offers adventure tourism activities. This particular ecolodge however has a unique qualities in the landscape that highly promotes rock climbing. The amenities on site strive to minimally impact the environment through biological components and reduce energy consumption. Sustainable qualities are defined to demonstrate the efforts made to keep the

Climate:		
Temperate	Temperatures 30°- 80°F Mean Temperature 64°F	Summer Monsoons
Arrival:		
40 km via highway north of Chihuahua, 33 km via dirt road	4 x 4 Vehicle Preferred	
Program:		
9 Suites, 3 Family Units and 1 Bunk House	Main Lodge Building	Dining Facility for 40 people
Outdoor Stargazing and Bonfire Area	Back of House	Managers Family House
Amenities & Activities:		
ATV Explorations	Horseback Riding	Rock Climbing
Nature Walks	Community Park Adjacent	
Sustainable Qualities:		
Solar Electricity	Solar Water Heater	Gravity Fed Plumbing from Cistern
Grey Water Reuse	No Air Conditioning	Eco Sandbag Walls
Nearby Quarry of Stone & Wood	Green Roof	

[Chart 16] Cumbres de Majalca Comparison Parameters



20 m



KEY

- | | |
|-----------------------------------|---------------------------|
| 1. Entrance | 6. Existing Casita |
| 2. Dining Hall & Lounge | 7. ATV & Mechanical Space |
| 3. Bunk & Family House | 8. Retrofit House |
| 4. Lower Casitas | 9. Retrofit House |
| 5. Nido de Aguilar (Eagle's Nest) | 10. Upper Casitas |

[Figure 91] Site Plan

environment stable for years to come.

Site Plan

The site plan is derived from *Chapter 12: Site Analysis* and *Chapter 13: Design Guidelines*. According to the series of diagrams conducted in these chapters the final design is accessed through the middle of the northern boundary of the site, nearest the community park improvement project. The main lodge is located against the secondary landscape feature with views facing the primary landscape feature. The family unit, bunk house and lower casitas are organized around a communal space at the center for star gazing and bonfires. Units in the lower flat area have more pedestrian traffic and the most simple accessibility compared to units along the ridge or upper region. Ridge units look out over the lower levels. The upper units follow the contours of the land to create the most private accommodations with inward looking views.

Architecture

The main lodge facility is located against a rock feature near the road access. The space holds many important functions that serve all the guests in the ecolodge. The lobby space has waiting areas on the interior and exterior, oriented with views toward the large rock formation. The interior lounge area has large north facing windows for maximum indirect day lighting and view to the road and river beyond. This space will predominately be used as a communal space for game playing, relaxation and meeting point for guide led activities such as ATV excursions and horseback riding. The front desk is utilized for information, scheduling, checking in/out and any other guest concerns. The dining room is nestled intimately with the rock face, revealing a natural element in a constructed space.

Private facilities also located in the main lodge facility that help support guest functions are the kitchen and manager's facilities. The kitchen can be accessed through the dining room or adjacent to the road. The road access is an employee only entrance used to restock groceries and supplies. The manager's home is attached to supervise guest operations and keep an eye on those accessing the adjacent road for safety and



- KEY
- 1. Drop Off Point
 - 2. Orientation Space
 - 3. Lobby
 - 4. Front Desk
 - 5. Dining Room
 - 6. Bathrooms
 - 7. Back of House
 - 8. Manager's Living Room
 - 9. Manager's Bathroom
 - 10. Manager's Bedroom

- KEY
- Focus Location on Site
 - Other Buildings on Site
 - Road Access



[Figure 92] Main Lodge



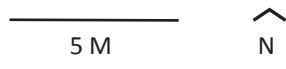
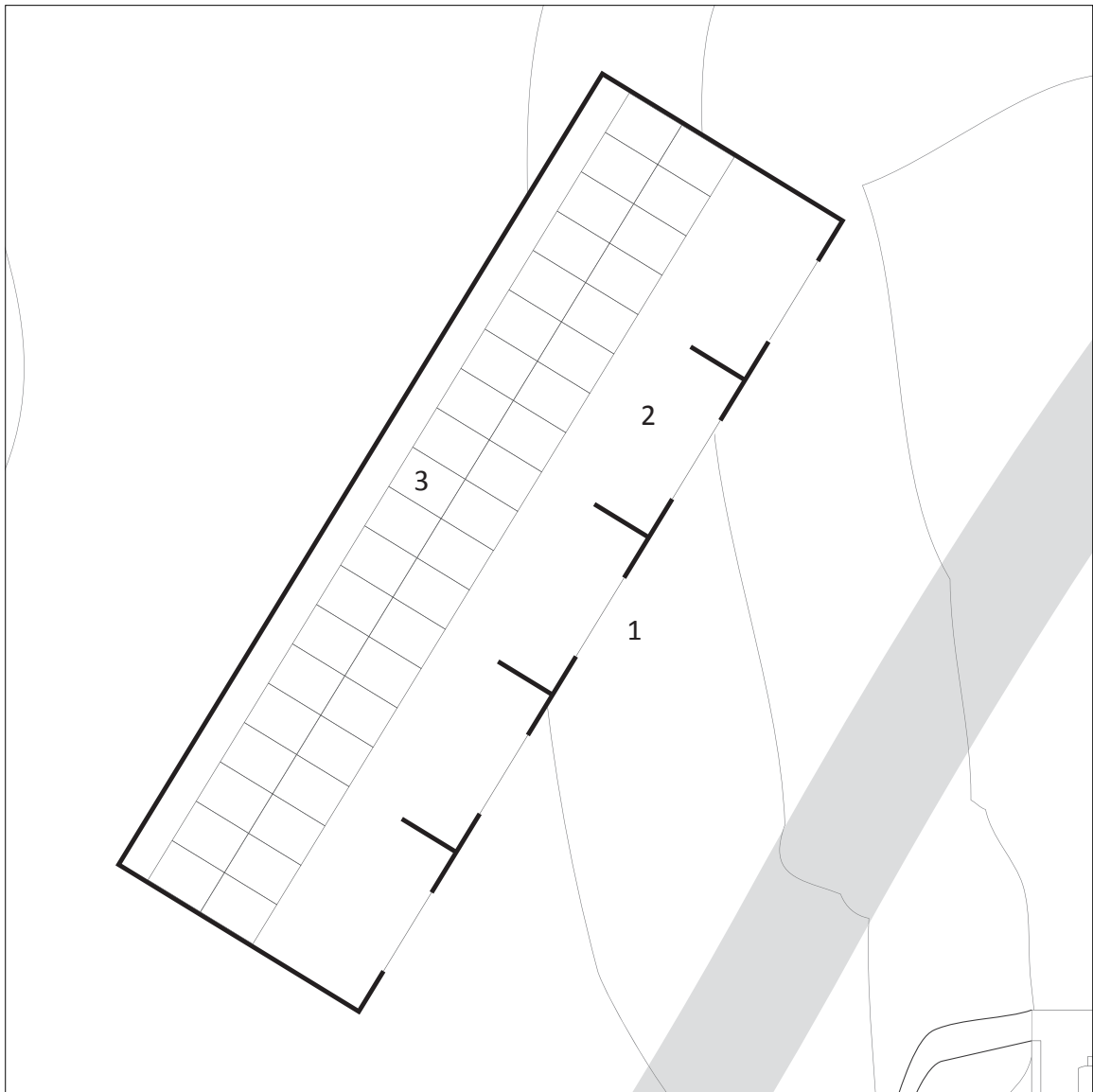
[Figure 93] Main Lodge & Nido de Aguila above arrivals.

Private employee driven functions are located near the main lodge building on the opposite side of the road. This portion of property is already separated from the rest due to a road easement. This separation is important to keep private, more noisy and visibly undesirable functions further from guests and easy access to the road by ATV's stored inside.

ATV storage and mechanical space is a vital space used by employees to ensure constant guest services. The largest area is dedicated to 40 ATV's parking in a secure building. These vehicles need to be constantly serviced with gas, oil and mechanical



[Figure 94] Main Lodge from Manager's Entrance

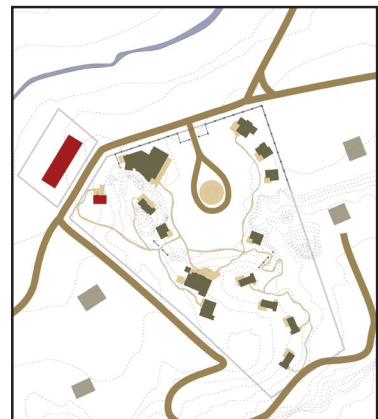


KEY

- 1. Access Point
- 2. Maintenance Space
- 3. ATV Parking

KEY

- Focus Location on Site
- Other Buildings on Site
- Road Access

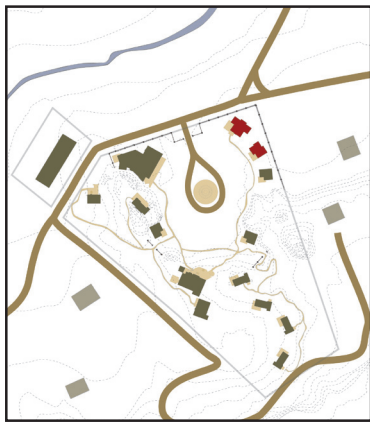


[Figure 95] ATV Storage



- KEY
- 1. Entrance
 - 2. Living room
 - 3. Bathroom
 - 4. Bedroom

- KEY
- Focus Location on Site
 - Other Buildings on Site
 - Road Access



[Figure 96] Bunk House

failures. Enough supplies should be accommodated for a four days at full capacity and all day use of ATV's. Other spaces dedicated in this building are mechanical supplies to up keep solar panels, back up generator and all general maintenance and services.

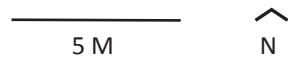
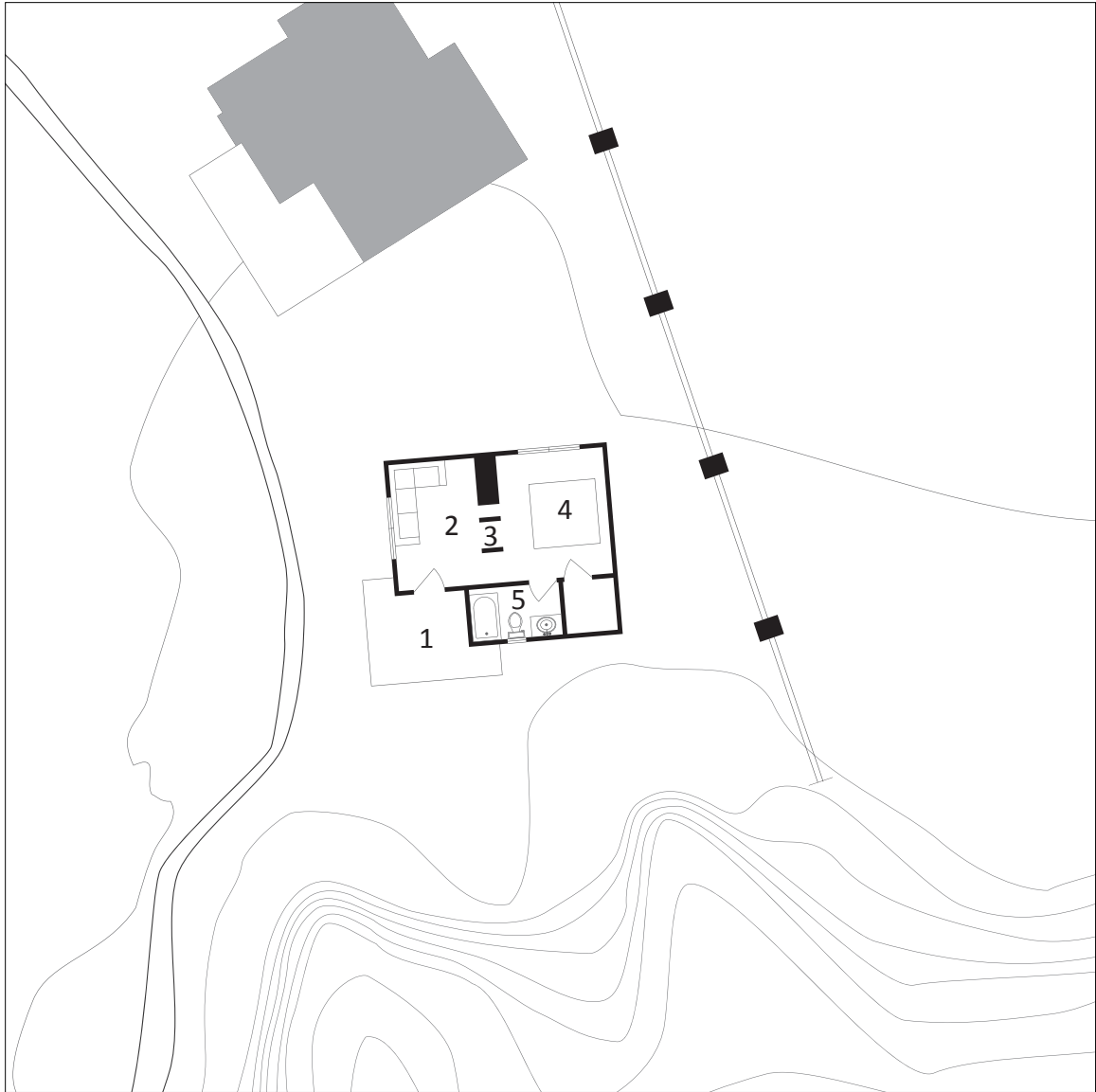
This space is not used by guests, all ATV excursions are lead by guides out of the main lodge space. The design and materials used in this particular building are much more simple and inexpensive than all other buildings on site. The street adjacent facade is the only side that should use higher considerations in its appearance due to its visibly.

The bunk house and family unit are located at the front of the property near the entrance. These units are placed the flat area near to the road and main lodge to accommodate guests with a more active space. Guests in the bunk house are projected to be more economical guests with a highly active lifestyle. Easy access to the main lodge and road will promote their get up and go mentality. Guests in the family unit will have to consider both children and the elderly. Little change in this location's terrain makes this location a physically safer location and important proximity to the main lodge facilities.

The bunk house has two rooms with two bunk beds in each room and a shared sitting area with a fire place, accommodating eight people total. The family unit also has two rooms however they are fitted with queen size beds to accommodate four people. Both units have the living areas oriented toward the center of the arch to provide more privacy in the bedrooms.

The lower casitas are located near base of a rock feature on the periphery of the flat space at the entry. Nuzzling these units up to the rocks create a desirable environment with easy access to the main lodge facilities. These units help define the spatial arc established in this low flat area, inspired from the circular pit houses.




The interior space is designed around a central hearth with the sitting area oriented toward the communal center and the bedroom located away from entry. Organizing these spaces in this way creates a square shape centralized around the hearth. Evidence found at Casas Grandes also demonstrate the importance of the hearth

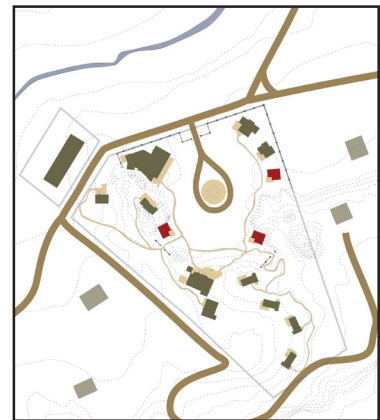


KEY

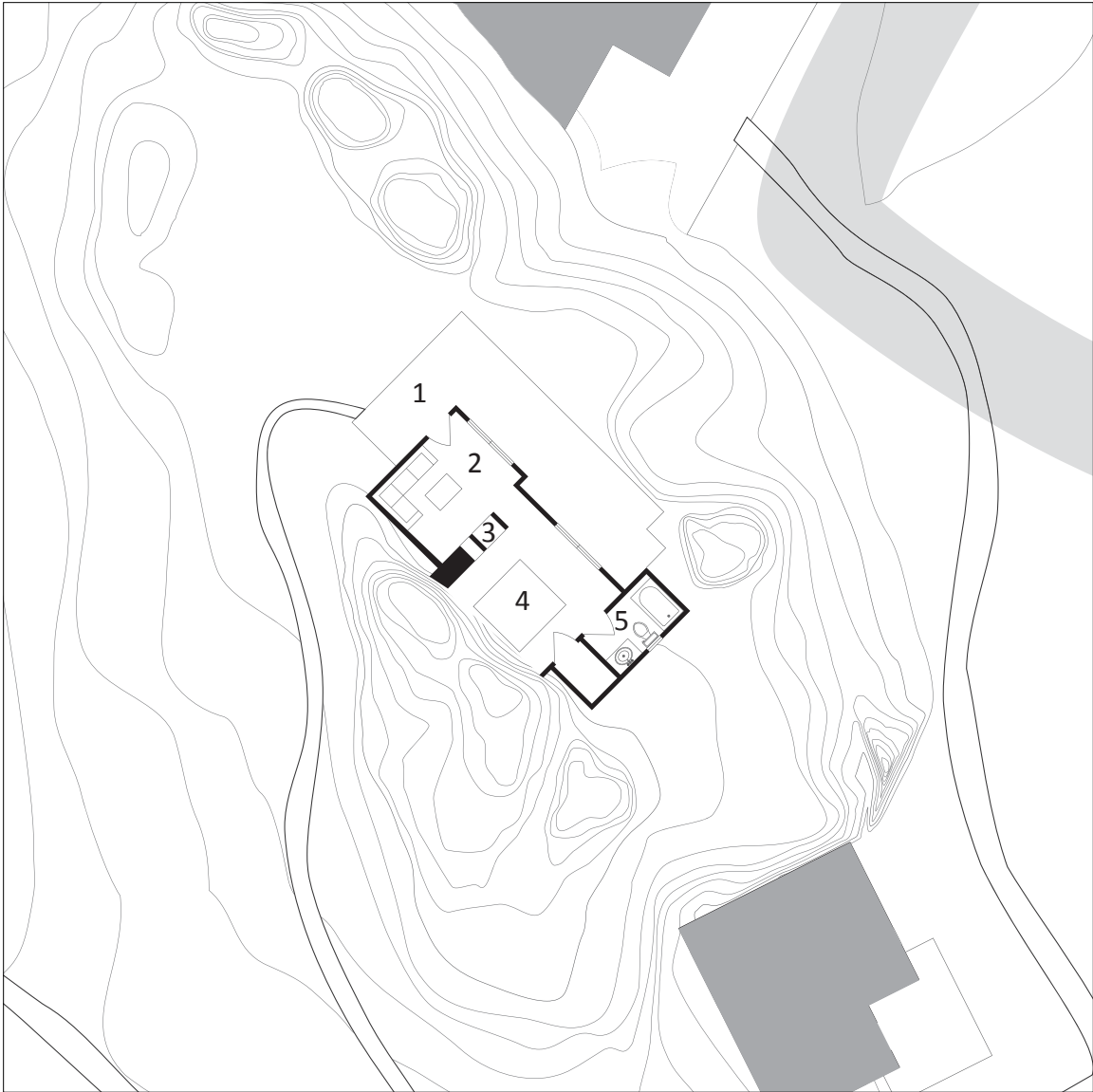
- 1. Entry
- 2. Living Room
- 3. Hearth
- 4. Bedroom
- 5. Bathroom

KEY

-  Focus Location on Site
-  Other Buildings on Site
-  Road Access



[Figure 97] Lower Casitas



KEY

- 1. Entry
- 2. Living Room
- 3. Hearth
- 4. Bedroom
- 5. Bathroom

KEY

- Focus Location on Site
- Other Buildings on Site
- Road Access



[Figure 98] Nido de Aquila

in interior spaces. The hearth provides heat as well as a gathering space.

This particular unit is a unique casita that is nestled into a rock formation. However, unlike the lower casitas, the Nido de Aguilar unit is much higher along the ridge. The higher elevation provides a vantage point that looks over the flat area and out to the river beyond. The floor plan is similar to the upper casitas with a linear approach. However the entrance is relocated due to the massive rock behind the unit. Instead of entering from the back, the entrance is on the side and views are oriented out between two large rocks.

This unit is made for two people and is organized around a hearth much like the other casitas. The northeast facade has large sliding window doors for natural light as well as a paved outdoor patio to forge the connection between inside and out.

These two buildings are existing structures on the site and are currently used as private houses. The larger building is the original home built in the 1920's. There have been renovations over the years to the original building's form and restoring basic functions like plumbing, roof and kitchen to accommodate for the evolution spaces and amenities.

Changes are made to both of these units to remove the kitchen because guests are provided with a dining facility in the main lodge space. The main house will convert the kitchen into a proportional bathroom because the existing one is entirely too small. Only interior walls will have to change to accommodate the proposed renovations.

The smaller house which was once used as the maid's house will also have the kitchen removed to create a full sized bedroom and shift interior walls to have the front entrance access the living space rather than the bedroom. This renovation will only call for the removal and relocation of two walls to transform the spaces function.

The upper casitas are located furthest from the entrance at the south end of the site. These units are the most private accommodations on site because of their distance from the communal space as well as the inward looking landscape. Unlike the other units that are oriented toward the central communal space, these units face toward one

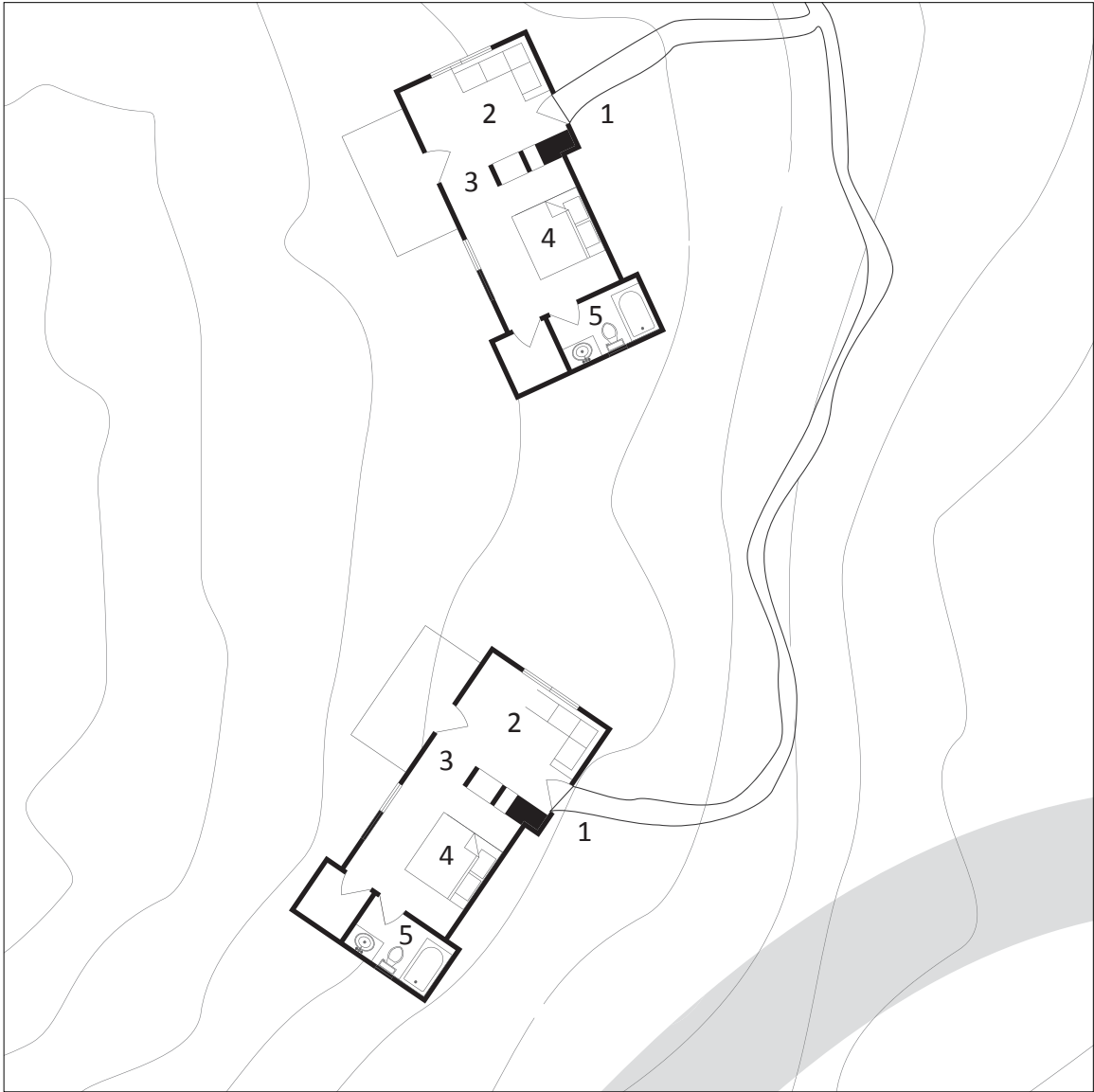


- KEY
- 1. Entrance
 - 2. Library
 - 3. Living Room
 - 4. Bathroom
 - 5. Bedroom

- KEY
- Focus Location on Site
 - Other Buildings on Site
 - Road Access



[Figure 99] Existing House

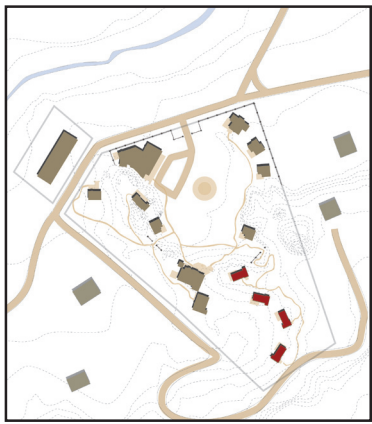


KEY

- 1. Entrance
- 2. Living Room
- 3. Hearth
- 4. Bedroom
- 5. Bathroom

KEY

- Focus Location on Site
- Other Buildings on Site
- Road Access



[Figure 100] Upper Casitas



[Figure 101] Main Lodge

another at a central point. This organization was created based on the natural landscape. Following the natural contours that create a bowl like feature the units views are oriented toward the east.

The spaces are oriented linearly and the entrance is located on the uphill side of the unit where it connects to the path way. There is a porch that connects to the living space on the downhill side of the unit and extends the visual connection to the outdoor spaces beyond.



[Figure 102] Main Lodge

Chapter Fifteen

SUSTAINABILITY

Material Selection

The material selection for new buildings constructed for the ecolodge are required to respond in a sustainable manner. The primary materials chosen for construction are rock, timber and eco-sandbag construction to make interior and exterior walls, roof and fixed furniture. The sources for all these building materials are important consider because the amount of artificial energy consumed in the manufacturing and development. Designing with the least environmental impact and lasting durability of construction will reduce the over all impact.

Residents in Cumbres de Majalca have used local materials for decades to build their homes due to the poor road conditions from the city. Many selected materials from the direct region they reside which caused a depletion of trees in community areas. As an act of preservation, the national park created a rule that prevents owners to use trees from the park constraints and started a reforestation program. Materials now have to be purchased from private land that surrounds the national park.

Rock, sand and timber used in the ecolodge construction can be bought outside the national park constraints where farmers are clearing land for agriculture or clearing for roads. These sources are much closer than the city of Chihuahua and are beneficial to those who own the land and reduce embodied energy it takes to harvest the materials and transport them to the ecolodge site. Using the bulk of materials from the surrounding area is not only an ecological responsibility but ascetically, new construction will reflect existing structures.

As a progressive step in utilizing all left over materials caused from breaking up large rocks, the smaller pieces will be used in the construction of eco-sandbag or earthbag walls.¹¹⁰ These walls will be covered in a plaster stucco finish instead of

110 The Sustainability Institute, 2009. Sustainable Neighborhood Design Manual: A Non-Technical Guide. Final Draft for Comment. Funded by the National Department of Housing and Cordaid. The Sustainability Institute, 2009.



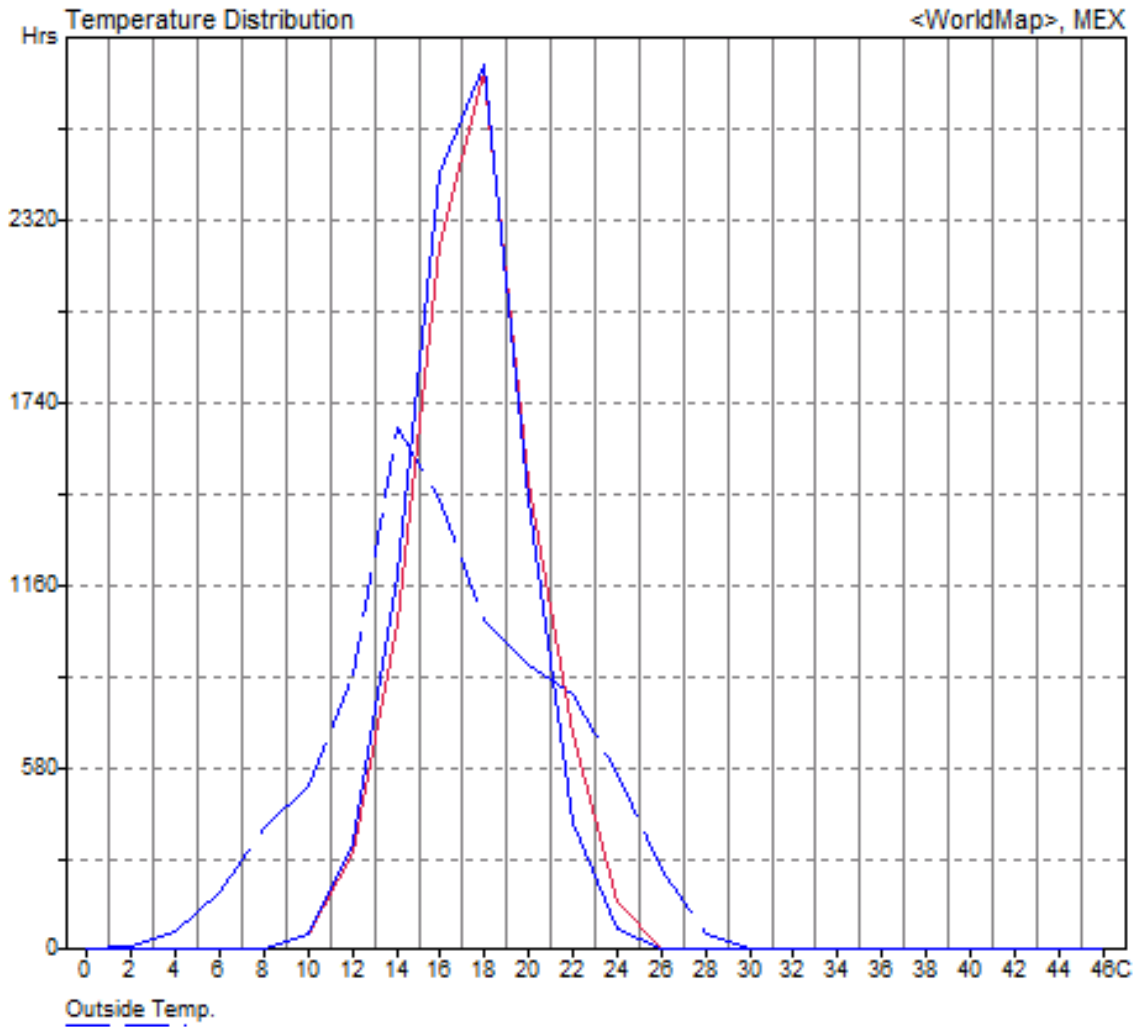
[Figure 85] Material Swatches

exposing the raw material in other walls. Eco-sandbag building requires less skilled labor, faster construction and uses the remaining material from larger rock wall construction. Using this method of construction is a cost efficient, eco-friendly and has similar thermal qualities to adobe.¹¹¹

All other materials to complete construction will need to be brought from the city of Chihuahua. Rustic refurbished doors, windows and furniture would enhance the ambiance and reinforce the mission to be environmentally friendly. Construction materials like stone and eco-sandbags make it easy to accommodate various sizes based on the availability of refurbished products. The flexibility in construction makes it easy to customize the design based on materials available at the time.

Traditional materials used at sites like Casas Grandes was sun dried adobe bricks, which act as a trombe wall. The heat during the day is stored in the material and released during the night when temperatures are lower due to the environment. Due to structural instability and insect problems with adobe brick technologies, eco-sandbag walls embody similar thermal qualities and higher structural stability. Annual temperatures and distribution between materials indicate constant internal temperature between 10-24°C. According to the BBC the ideal indoor temperature is 18°C in residents

111 The Sustainability Institute, 2009. Sustainable Neighborhood Design Manual: A Non-Technical Guide. Final Draft for Comment. Funded by the National Department of Housing and Cordaid. The Sustainability Institute, 2009.



Temperature Distribution:		
Temperature (Celsius)	Hours	Percent
8	0	0.0%
10	58	07%
12	349	4.0%
14	1200	13.7%
16	2494	28.5%
18	2676	30.5%
20	1479	16.9%
22	430	4.9%
24	74	0.8%
26	0	0.0%

[Chart 12] Ec lodge Temperature Distribution

Fresh Water Use (daily per person)	
Shower	13.2 gallons
Faucet	11.4 gallons
Total	24.6 gallons
30% Less Energy Efficient	-7.38 gallons
Freshwater Total	17.22 gallons
Water Tank Size	
Capacity	32 gallons
Dimensions	
Grey Water Use (daily per person)	
Toilet	19.3 gallons
Landscape	Remaining

[Chart 13] Fresh Water Consumption and Grey Water Reuse

home.¹¹² This is the mean temperature in the unit according to material transfer from the Ecotect software.

When the internal conditions become either too warm or cold there are easy solutions to make the space more comfortable. Each unit has a hearth that adds continual warmth to the internal gain when temperatures are below standard comfort levels or create more ventilation through a fan to reduce a warmer climate.

Sustainable Water Use

The water supply for the ecolodge comes from a well on site, pumped to each building with a solar water pump. Each building requires its own water tank that supplies the accommodation with fresh water for showering and sink use. The water is then collected from these sources and is treated as grey water for reuse in the toilet and landscape purposes. To calculate the size of the fresh water tank and grey water reuse tank, daily consumption rates and fixture efficiency rates need to be identified for the conditions in the unit.

Each accommodation only requires bathroom affiliated water use due to the central lodge facility that provides all other functions that require fresh water. According

112 Lane, Megan. "How warm is your home?." BBC news magazine, March 3, 2011. <http://www.bbc.co.uk/news/magazine-12606943> (accessed April 9, 2012).



32-Gallon Pressurized Well Tank	
Length-	.53 meters (20.7")
Height-	.9 meters (35.2")
Width-	.53 meters (20.7")
Weight-	42.7 lb.
<hr/>	
Brand Name-	Water Worker
Model Number-	HT32B
Part Number -	HT32B

[Figure 86] Water Tank System for Units

[Chart 14] Product Information

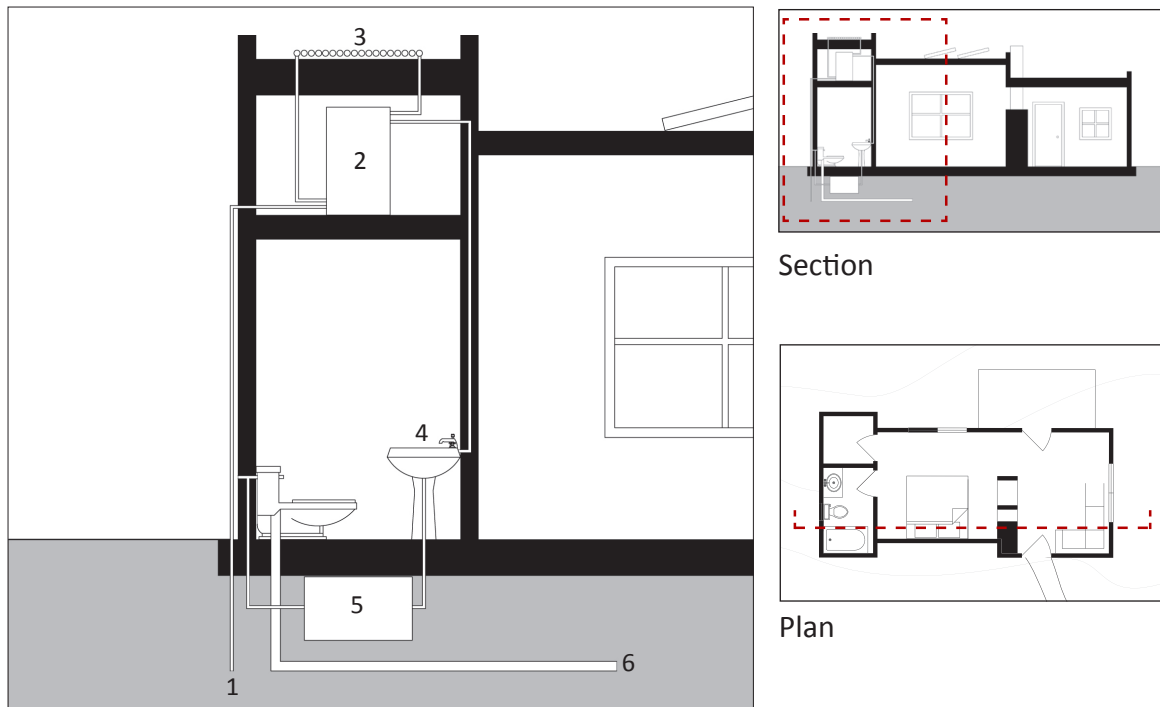
to the American Water Works Association, the average person uses 24.6 gallons of water a day in showers and faucets.¹¹³ The use of energy saving fixtures will consume 30% less water, leaving only 17.22 gallons per day. Grey water reuse from showers and faucets will be used in toilets to reduce the overall fresh water consumption.

Based on daily water use and double occupancy suites, each unit would require a minimum of 17.22 gallons of water a day. The advisable size for a well water tank would be 32 gallons per unit to ensure two days water to allow time to refill all the tanks from the well source. The grey water tank would have to be at a similar 40 gallons to keep a supply for all toilet and landscape use. Not only does grey water reuse reduce the amount of fresh water use, but there are many other ecological benefits. Remaining grey water that is not used for toilet water and discarded in the septic system, is used for landscape. Using grey water will enrich top soil, groundwater recharge, increased plant growth, and replenish environments even in times of drought.¹¹⁴

The Water Worker 32-Gallon Pressurized Well Tank is constructed of steel

113 American Water Works Association, Water Use Inside the Home 2010 Water Use Summary. United States Environmental Protection Agency, Office of Water, Fact Sheet: 21 Water Conservation Measures for Everybody.

114 The Sustainability Institute, 2009. Sustainable Neighborhood Design Manual: A Non-Technical Guide. Final Draft for Comment. Funded by the National Department of Housing and Cordaid. The Sustainability Institute, 2009.



KEY

1 m

1. Fresh Well Water
 2. Well Water Tank
 3. Passive Solar Heating
 4. Fresh Water Use
 5. Grey Water Filtration Tank
 6. Septic Disposal of Toilet Water

[Figure 87] Holistic Water System for Units

for durability. The product holds 32 gallons of water however, because the tank is pressurized it is equivalent to 82 gallons in a regular tank. The naturally pressurized tanks are pre-charged to 38 psig and are capable of 100 psig working pressure. The enclosed unit has little to no maintenance and keeps the pressure for many years.

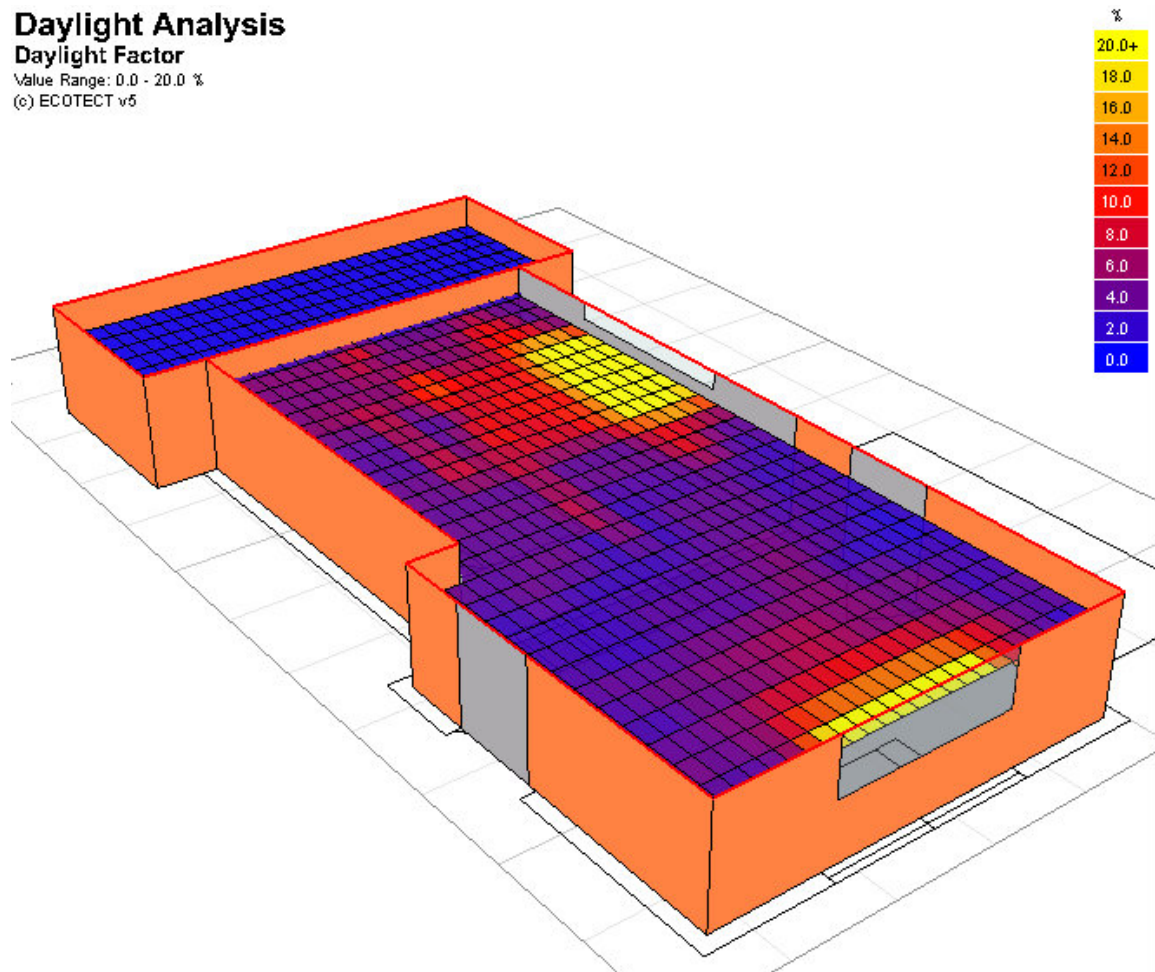
As a part of the holistic water system used in each unit, in figure 87, solar hot water is an important component in making the accommodations comfortable. The ecolodge is not attached to any mainline electrical grid, the solar hot water is an entirely passive system. The system operates through the natural transfer between hot and cold water and continues to work with normal water flow rates.¹¹⁵

115 The Sustainability Institute, 2009. Sustainable Neighborhood Design Manual: A Non-Technical Guide. Final Draft for Comment. Funded by the National Department of Housing and Cordaid. The Sustainability Institute, 2009.

Daylight Analysis

Daylight Factor

Value Range: 0.0 - 20.0 %
(c) ECOTECH v5



[Figure 88] Ecotect Daylight Analysis

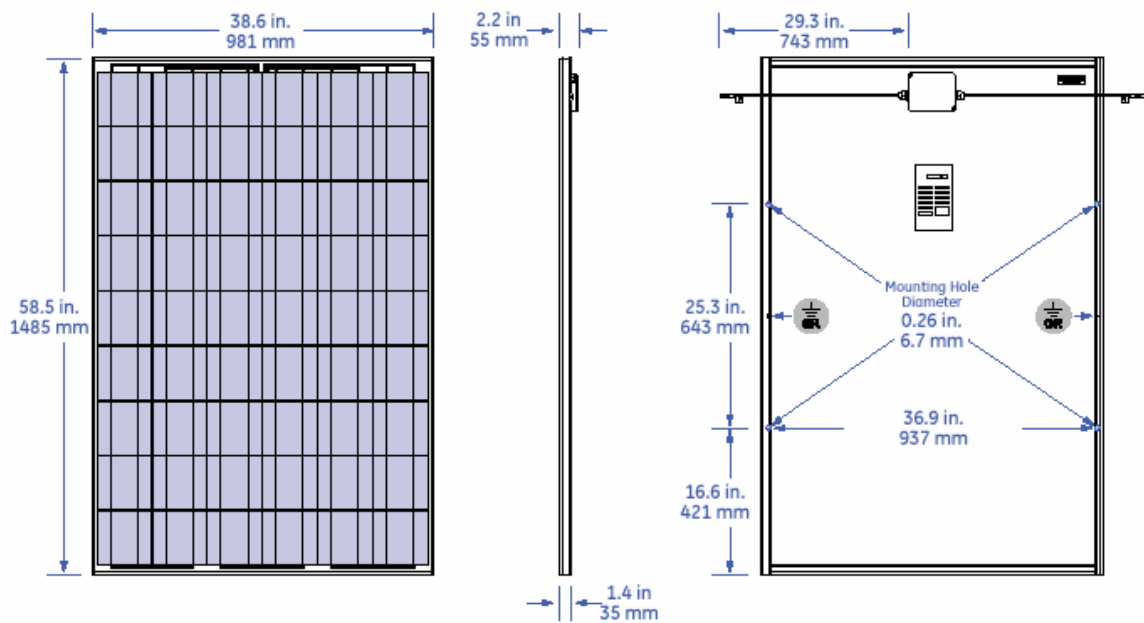
Solar Energy

Ecologde accommodations require particular electrical requirements that make visitors more comfortable in the environment. Electrical requirements for the units make guests feel comfortable in a rural setting. Calculations for electrical use and sizing per unit are based on artificial lighting loads, possible use from plugs and a ceiling fan. Due to material selection, thermal qualities maintain a comfortable temperature inside and doesn't require electrical assistance to make the space more comfortable. Simple thermal control measures can be made with a ceiling fan and opening windows or the hearth fire place that helps warn the rooms are cold. To maintain particular standards for guests.

Proper daylight analysis also helps reduce the amount of artificial light needed

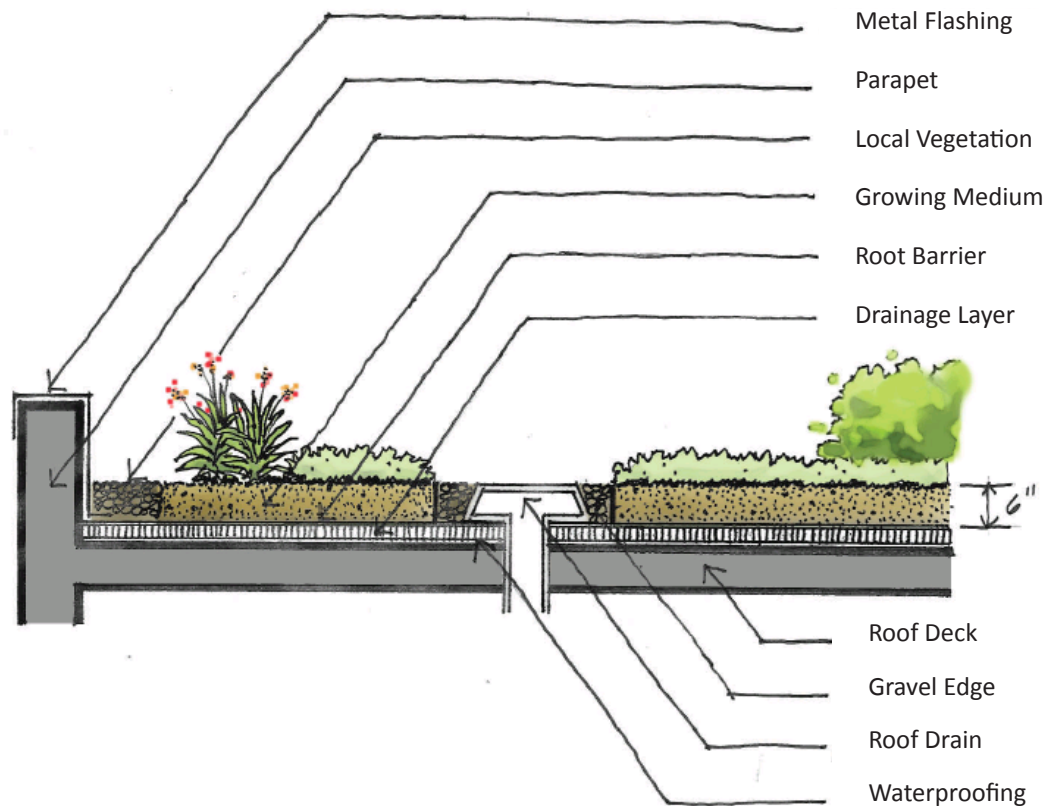
Average Electricity Usage (per hour)			
Object	Watts per Hour	Hours a Day	Total Watts
Ceiling Fan	80 Watts	10	800 Watts
Computer Laptop	45 Watts	10	450 Watts
Bulb	25 Watts	10	250 Watts
Water Pump	746 Watts	1	746 Watts
Hair Appliances	1,000 Watts	.5	500 Watts
Total			2,746 Watts
Calculation			
	2,624 Watts /6 hours		= 458 Watts/hour
	458 Watts/hour x 1.3		= 595 Watts/hour

[Chart 15] Energy Consumption



[Figure 89] Prototypical 200 Watt Solar Panel Dimensions

during the day in interior spaces. Altering the size and placement of the windows will change the amount of light entering the space based on the angle of the sun. Creating a space without too much or too little light will maintain thermal qualities and reduce artificial lighting loads. Studies using Ecotect, as seen in figure 88, can gage the proper lighting levels. After many different configurations for the window heights, orientation and sizes the design has found an example of proper lighting levels.



[Figure 90] Green Roof Material Assembly

Minimizing electrical consumption through thermal control and natural day lighting will reduce the electrical demand on the solar the solar panels. Each unit's electrical demand accounts for a ceiling fan, laptop, light bulbs, back up water pump, and hair appliances. Chart 15 explains the daily consumption of energy is 2,746 Watts of energy per unit a day. Based on an average of 6 hours of light a day in Chihuahua, the solar panels would need to generate 458 Watts during those hours. As a cushion, the electrical load it is recommended to multiply the potential demand by 1.3 to ensure that all the energy is not consumed during the night. The recommended solar catchment per unit is to gather approximately 595 Watts per hour. It takes three 200 Watt solar panels to power each unit. Figure 89 is a prototypical guide for the dimensions for each of the three panels.

Green Roof

As an active response to *Chapter 2: Sustainability*, the design project addresses

architecture and its effect on ecological interdependencies. On the macro level, material choices embody the largest amount of impact. The use of local materials reduces the amount of transportation and level of processing. Incorporating traditional ecological knowledge these materials can create interior spaces that are comfortable year round. On a micro level, natural habitats of birds, insects, and even bacteria are displaced when a building is constructed. In attempt to replace the ecological balance in the environment, green roofs are implemented in the design project. Green roofs help keep the natural environment stable with out displacing plants or animals natural patterns. Essentially the additional labor and cost of adding layers to properly waterproof and drain is minimal. Restoring the environment after the construction of the building will help the natural patterns of pollination and other biological components stay regular in the environment.

failures. Enough supplies should be accommodated for a four days at full capacity and all day use of ATV's. Other spaces dedicated in this building are mechanical supplies to up keep solar panels, back up generator and all general maintenance and services.

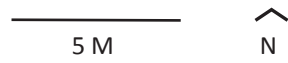
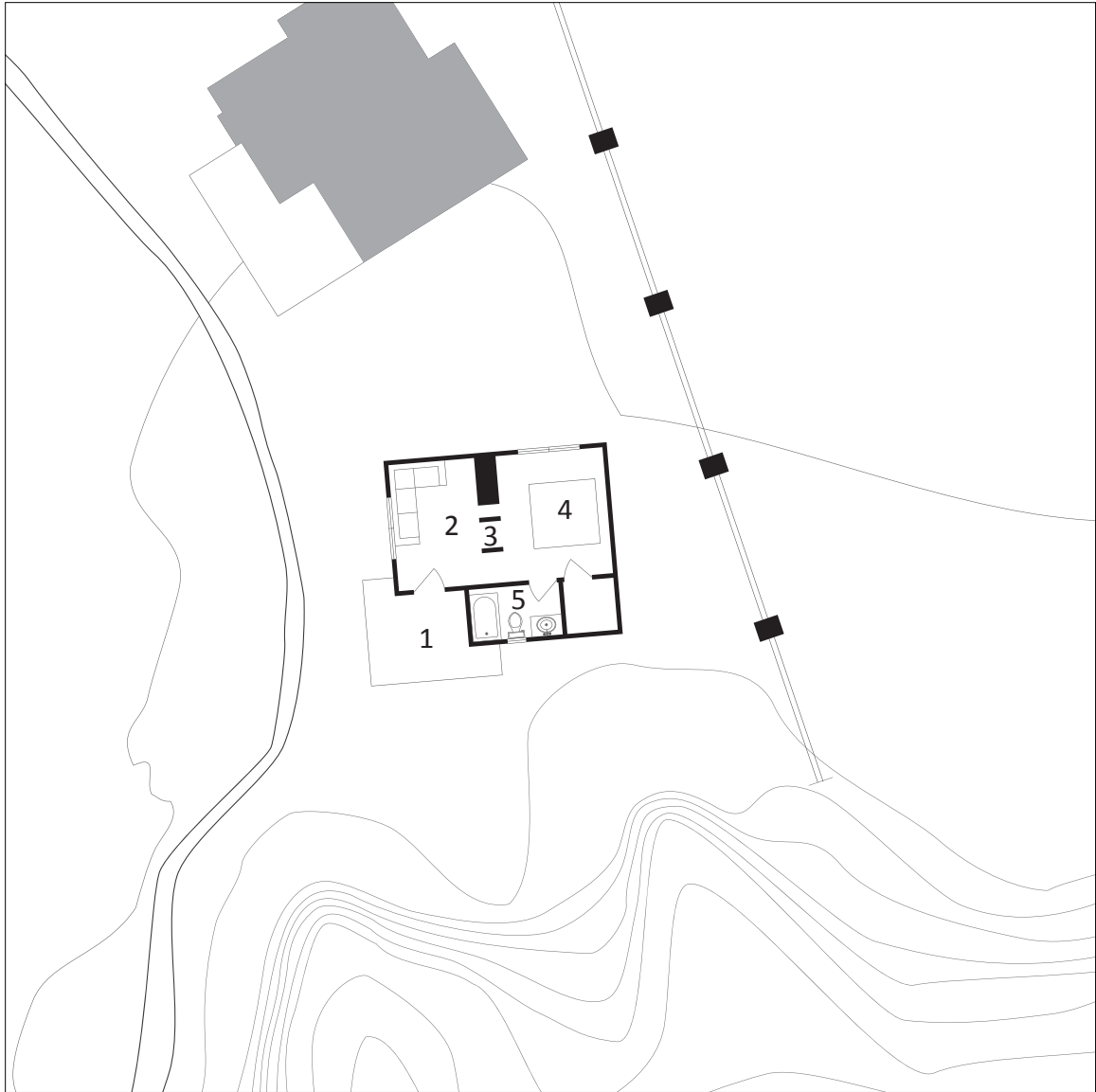
This space is not used by guests, all ATV excursions are lead by guides out of the main lodge space. The design and materials used in this particular building are much more simple and inexpensive than all other buildings on site. The street adjacent facade is the only side that should use higher considerations in its appearance due to its visibly.

The bunk house and family unit are located at the front of the property near the entrance. These units are placed the flat area near to the road and main lodge to accommodate guests with a more active space. Guests in the bunk house are projected to be more economical guests with a highly active lifestyle. Easy access to the main lodge and road will promote their get up and go mentality. Guests in the family unit will have to consider both children and the elderly. Little change in this location's terrain makes this location a physically safer location and important proximity to the main lodge facilities.

The bunk house has two rooms with two bunk beds in each room and a shared sitting area with a fire place, accommodating eight people total. The family unit also has two rooms however they are fitted with queen size beds to accommodate four people. Both units have the living areas oriented toward the center of the arch to provide more privacy in the bedrooms.

The lower casitas are located near base of a rock feature on the periphery of the flat space at the entry. Nuzzling these units up to the rocks create a desirable environment with easy access to the main lodge facilities. These units help define the spatial arc established in this low flat area, inspired from the circular pit houses.




The interior space is designed around a central hearth with the sitting area oriented toward the communal center and the bedroom located away from entry. Organizing these spaces in this way creates a square shape centralized around the hearth. Evidence found at Casas Grandes also demonstrate the importance of the hearth

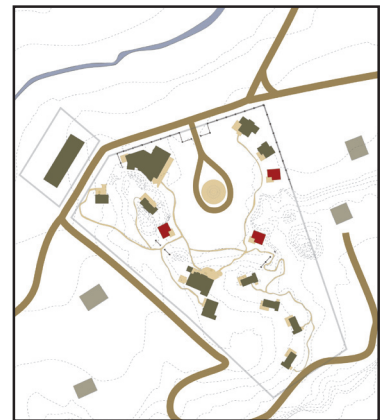


KEY

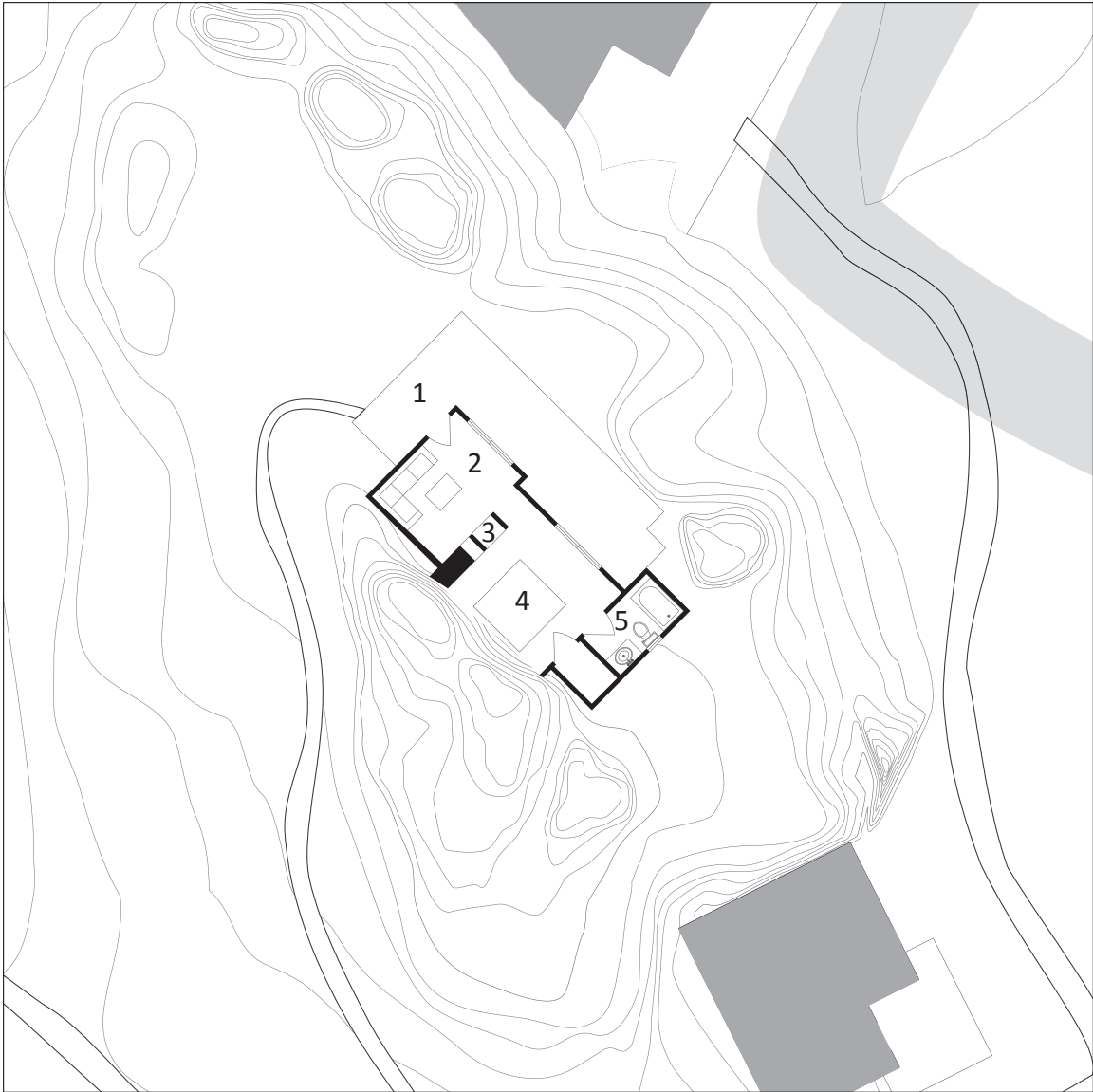
- 1. Entry
- 2. Living Room
- 3. Hearth
- 4. Bedroom
- 5. Bathroom

KEY

-  Focus Location on Site
-  Other Buildings on Site
-  Road Access



[Figure 97] Lower Casitas



KEY

- 1. Entry
- 2. Living Room
- 3. Hearth
- 4. Bedroom
- 5. Bathroom

KEY

- Focus Location on Site
- Other Buildings on Site
- Road Access



[Figure 98] Nido de Aquila

in interior spaces. The hearth provides heat as well as a gathering space.

This particular unit is a unique casita that is nuzzled into a rock formation. However, unlike the lower casitas, the Nido de Aguilar unit is much higher along the ridge. The higher elevation provides a vantage point that looks over the flat area and out to the river beyond. The floor plan is similar to the upper casitas with a linear approach. However the entrance is relocated due to the massive rock behind the unit. Instead of entering from the back, the entrance is on the side and views are oriented out between two large rocks.

This unit is made for two people and is organized around a hearth much like the other casitas. The northeast facade has large sliding window doors for natural light as well as a paved outdoor patio to forge the connection between inside and out.

These two buildings are existing structures on the site and are currently used as private houses. The larger building is the original home built in the 1920's. There have been renovations over the years to the original building's form and restoring basic functions like plumbing, roof and kitchen to accommodate for the evolution spaces and amenities.

Changes are made to both of these units to remove the kitchen because guests are provided with a dining facilities in the main lodge space. The main house will convert the kitchen into a proportional bathroom because the existing one is entirely too small. Only interior walls will have to change to accommodate the proposed renovations.

The smaller house which was once used as the maid's house will also have the kitchen removed to create a full sized bedroom and shift interior walls to have the front entrance access the living space rather than the bedroom. This renovation will only call for the removal and relocation of two walls to transform the spaces function.

The upper casitas are located furthest from the entrance at the south end of the site. These units are the most private accommodations on site because of their distance from the communal space as well as the inward looking landscape. Unlike the other units that are oriented toward the central communal space, these units face toward one

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