



Gensler



MAKARA

RESORT | SPA | COMUNIDAD
CONDO-HOTEL + RESTAURANTE
Ballena | COSTA RICA Agosto 2008
SUSTAINABILITY STRATEGY



Sustainability Goals & Benefits

Developing a Strategy

A sustainability strategy requires a unique set of goals specific to type and scale of a building, the climate zones its in and the occupants it serves. The following report outlines the strategy taken for Makara.

“Whole Building” Approach

This integrated or ‘whole building’ design approach requires thinking about the building and its site as a series of inter-linked and interdependent systems, so that a single design refinement might simultaneously improve several building systems’ performance.

Makara Sustainability

Proven Strategies

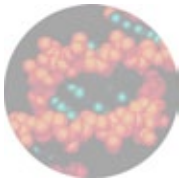
Sustainable or “high-performance” designs draw on principles used in conventional building practices. In fact, most passive strategies have their roots in vernacular designs developed over time in the absence of any mechanical ventilation and air conditioning equipment. These strategies can yield significant savings, if employed appropriately and with regard to local site context and climate conditions.

We therefore focused to get the most out of the materials at hand – landscape features, site planning, and the local climate – before invoking electrical and mechanical assistance from energy-driven cooling, and lighting systems. High-performance design also favors “state-of-the-shelf” technology over sophisticated state-of-the-art equipment.

Sustainability Goals & Benefits



Environmentally Sensitive Site Development



Bio-Climatic Design & Passive Strategies



Sustainable Materials Strategy



Community Connection

Strategy



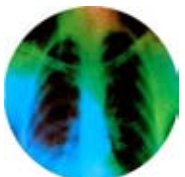
Reduced Carbon Footprint



Reduced Energy Consumption



Reduced Operating and Maintenance Cost



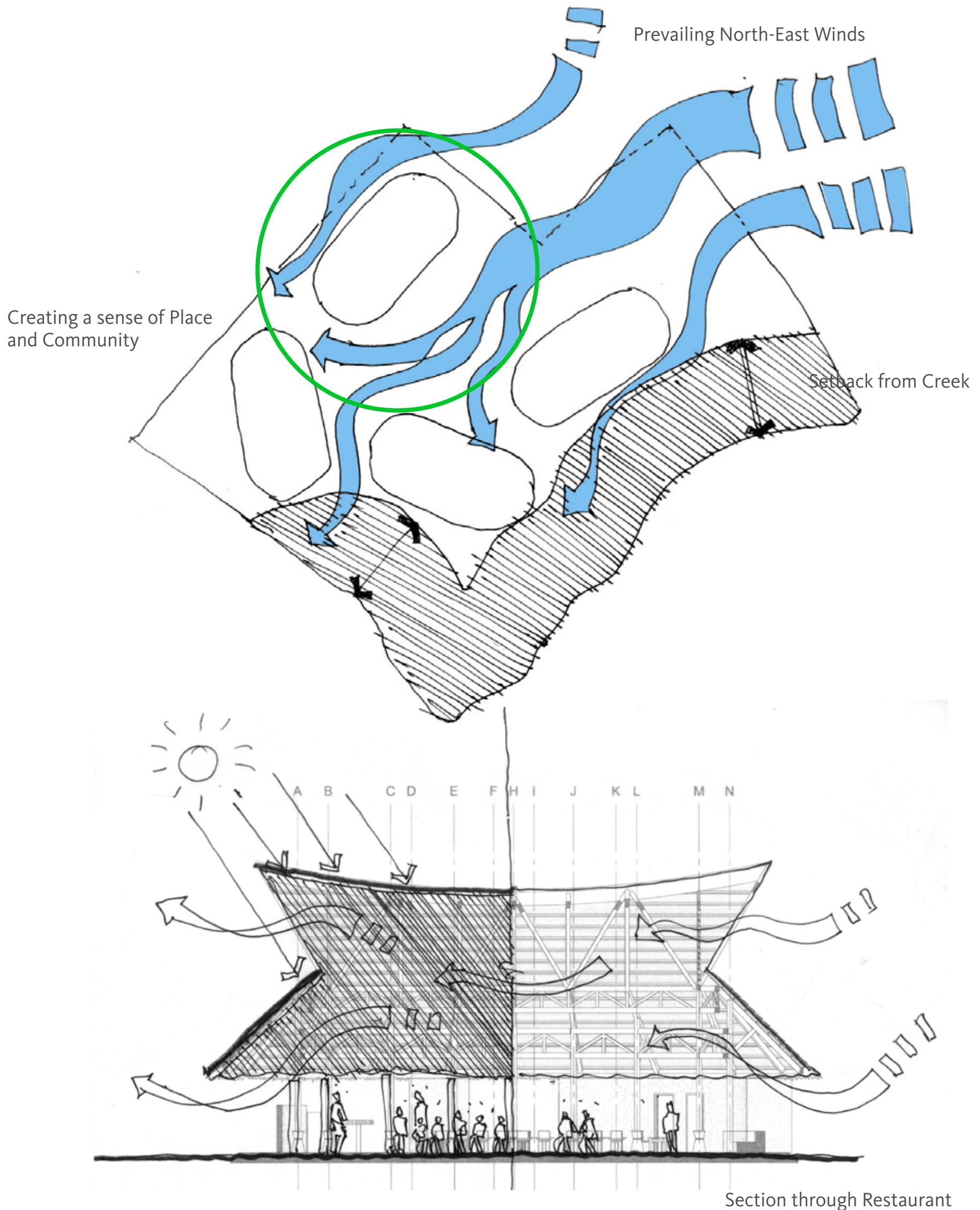
Increased Occupant Comfort

Environmentally Sensitive Site Development

Prevailing Winds and Building Location

The buildings are located around a central water feature, creating a sense of place and community, while respecting a buffer to the adjacent creek.

This setting also allows for free circulation of the prevailing North-East winds and maximizes the passive cooling.

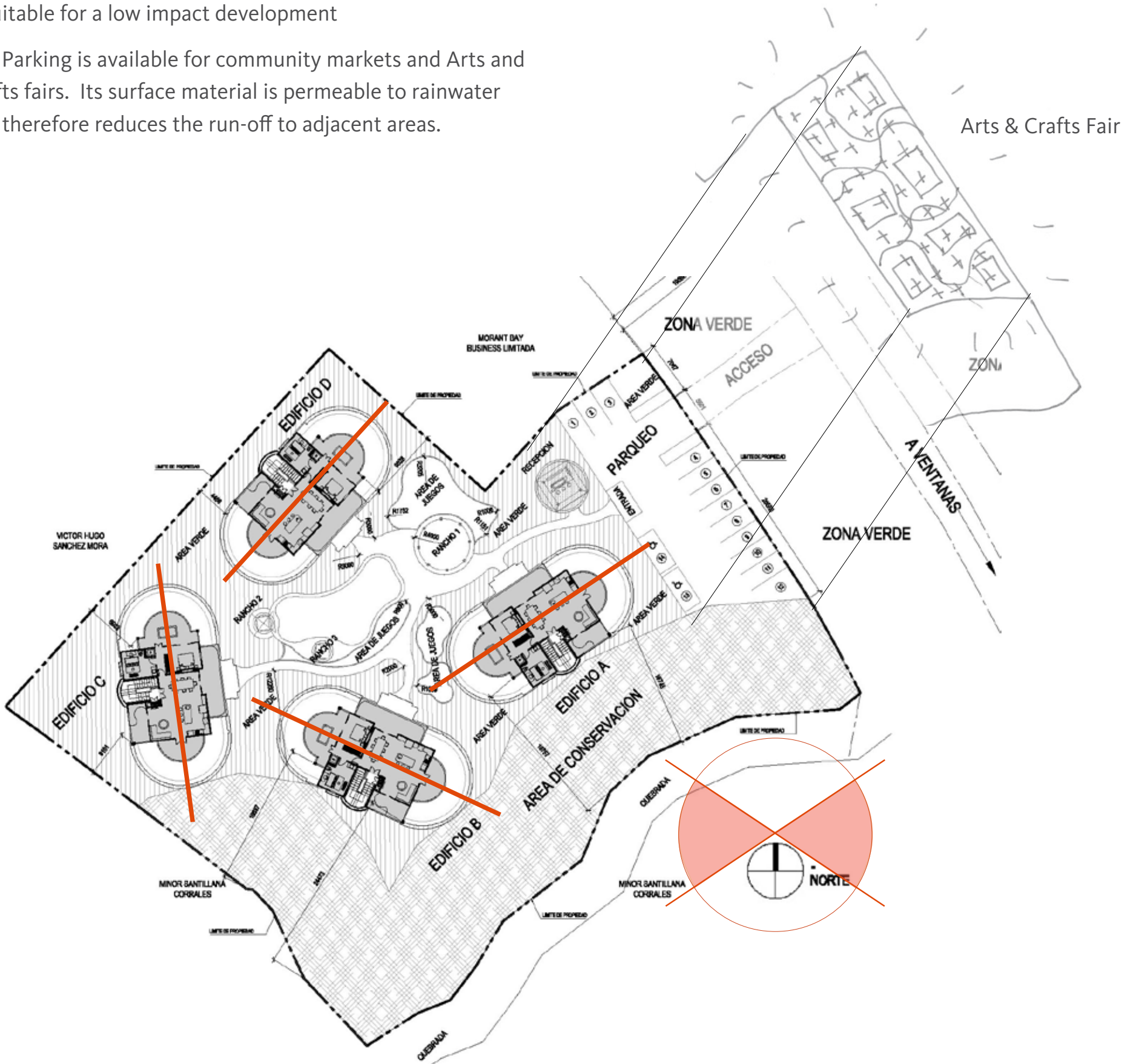


Environmentally Sensitive Site Development

Massing, Orientation, and Land Use

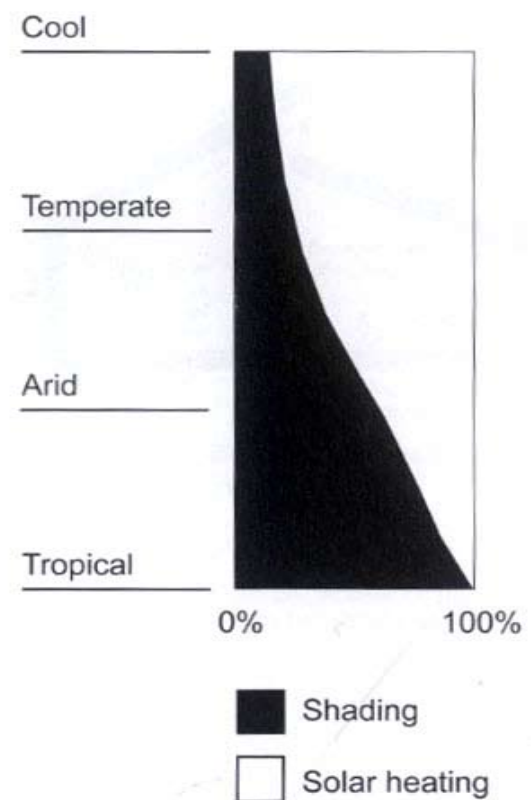
The site is relatively flat and has very few trees which makes it suitable for a low impact development

The Parking is available for community markets and Arts and Crafts fairs. Its surface material is permeable to rainwater and therefore reduces the run-off to adjacent areas.



Massing and Building Orientation

As much as the site allows, buildings are oriented in East-West direction, which minimizes the exposure to solar radiation on the facade in the morning and afternoon. Building "C" does not follow this rule, but is protected by surrounding trees and buildings. Wide roof overhangs effectively protect all buildings from the hot mid-day sun.

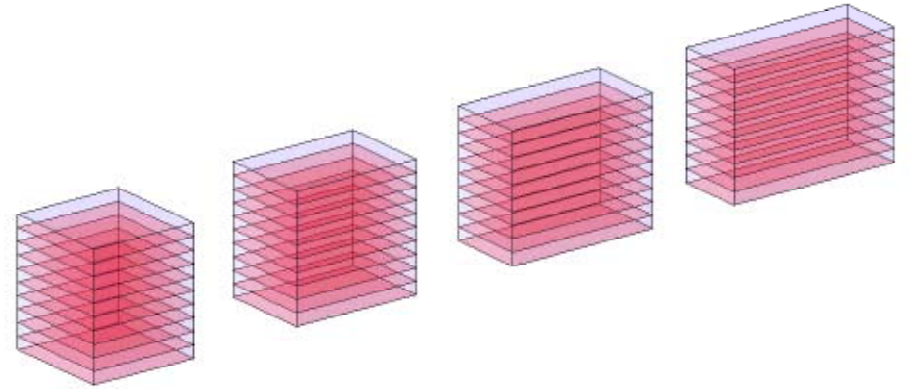


Bio-Climatic Design & Passive Strategies

Aspect Ratio

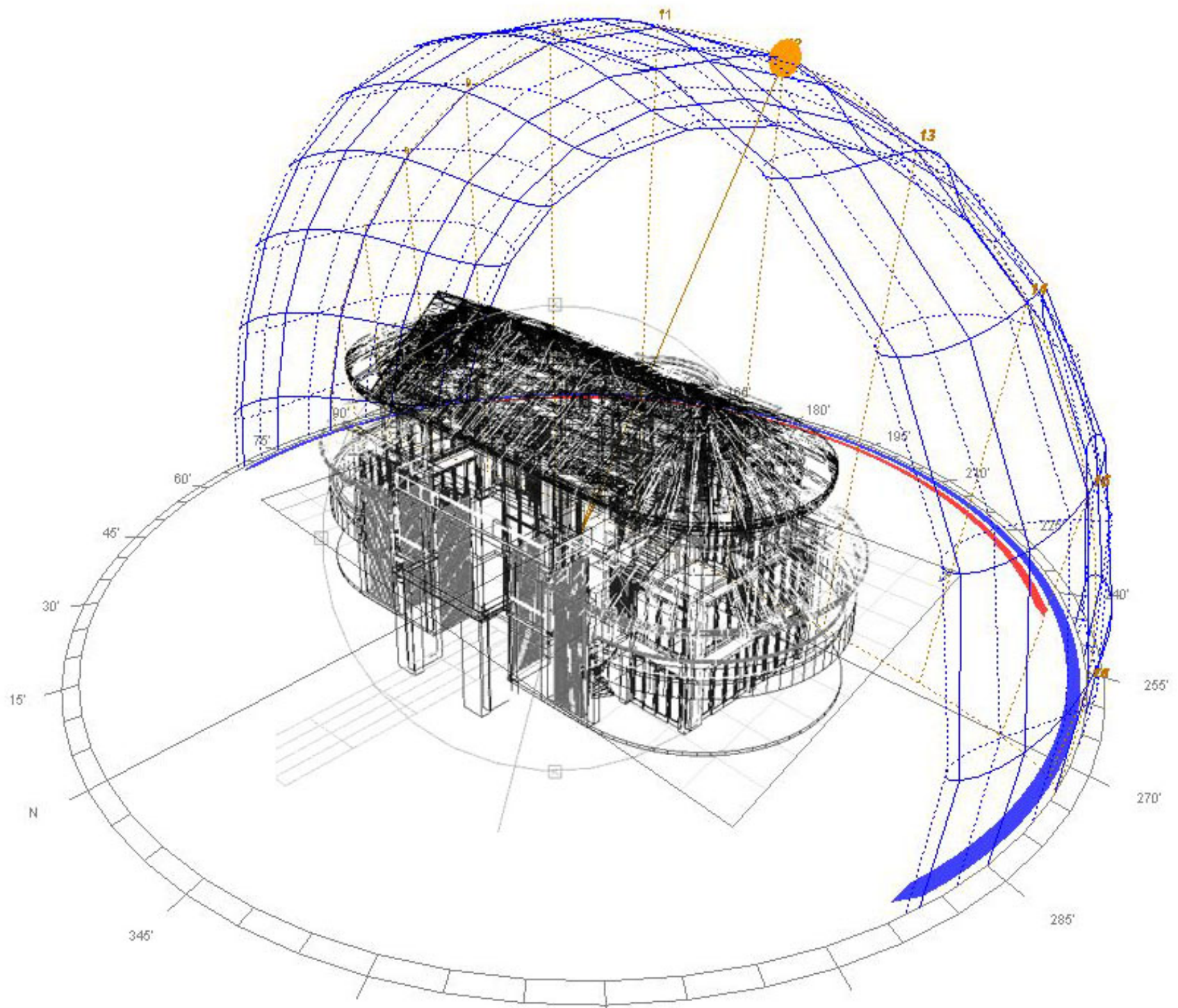
The relationship between the long and short facade of a building (aspect ratio) also has an effect on unwanted solar gain. A 1:3 ratio has proven to be most beneficial in tropical climates, as long as the building is approximately oriented in East-West direction.

Aspect Ratio	Climate Zone	Surface to Volume Ratio
1 to 1	cool	0.36
1 to 1.8	temperate	0.37
1 to 2	arid	0.38
1 to 3	tropical	0.41



Solar Analysis

The buildings are designed to maximize shading and minimize solar heat gain.



Bio-Climatic Design & Passive Strategies

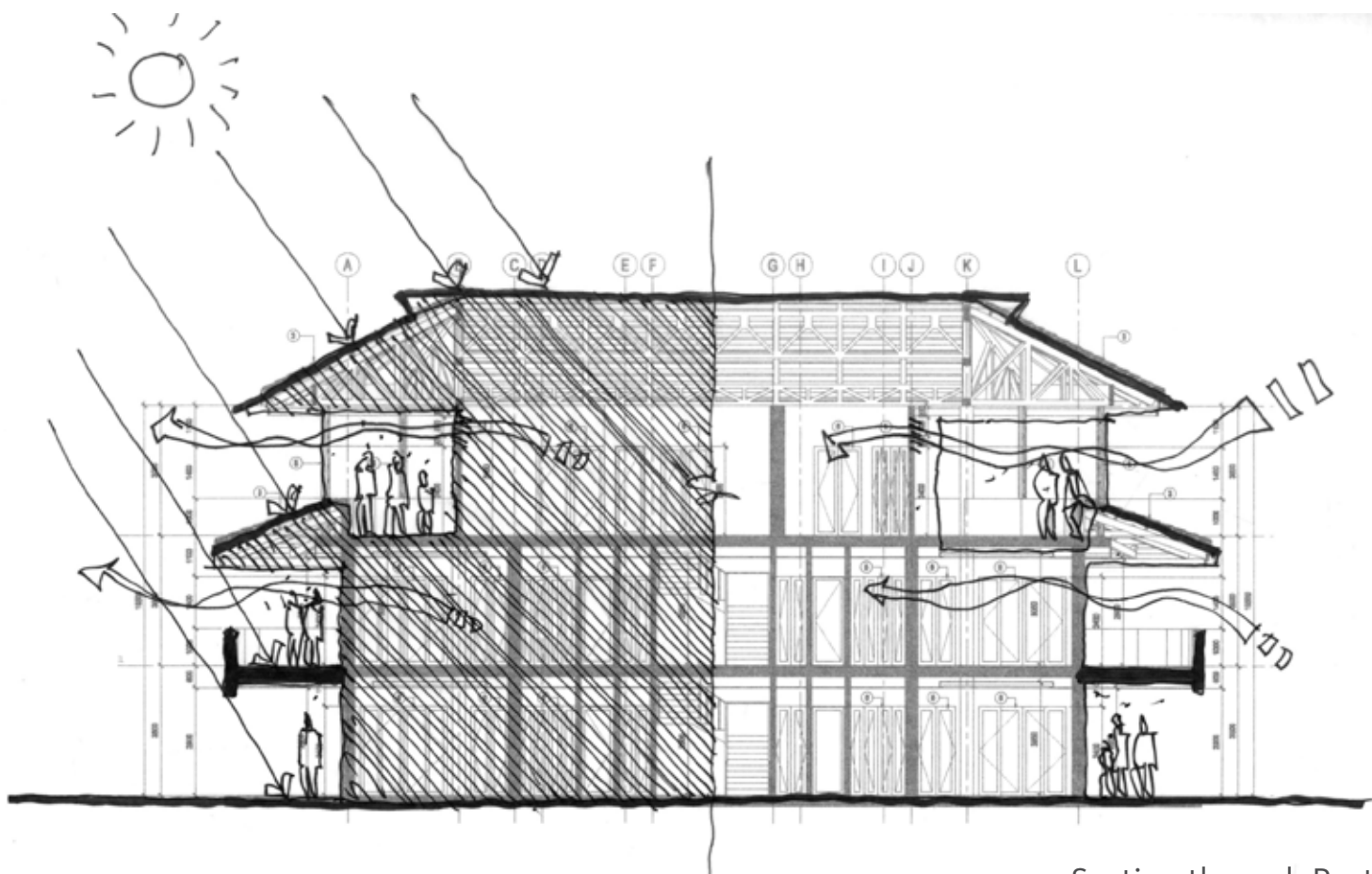
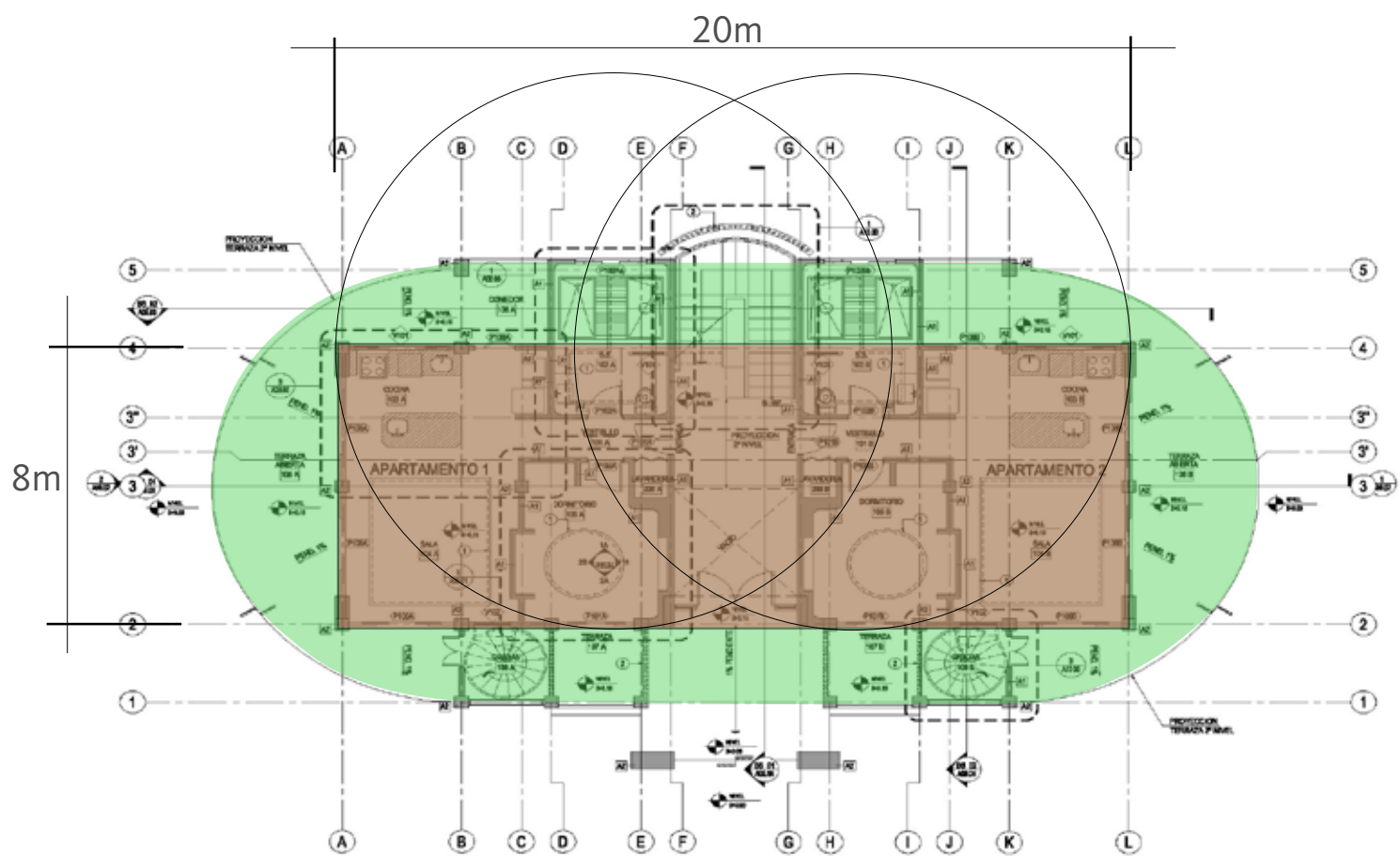
Building Elements

High Ceilings allow for a cooler environment.

Operable windows and louvers assist with cross ventilation. Alternative ventilation systems such as fans can be installed easily.

Air-conditioning is provided to assure thermal comfort, when outdoor conditions do not favor natural ventilation. The system but can be controlled by each user, promoting minimum impact.

Ample shade and awnings provide additional cooling.



Section through Restaurant

Community Connection

Inspiration from Local Vernacular Designs

Architectural form inspired from indigenous settlements and input from local tribe leaders and it accumulates substantial humidity.

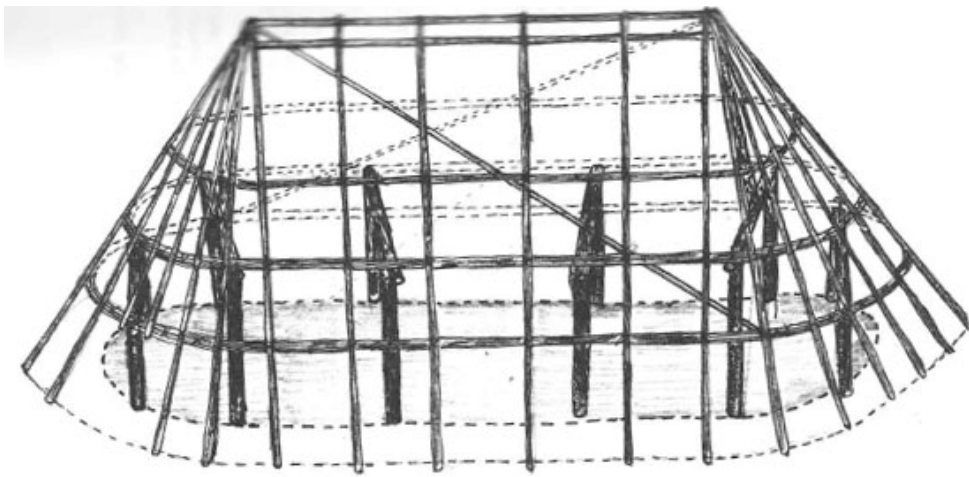


FIGURA 11: Orówe antiguo. Según datos del owó Francisco Figueroa.

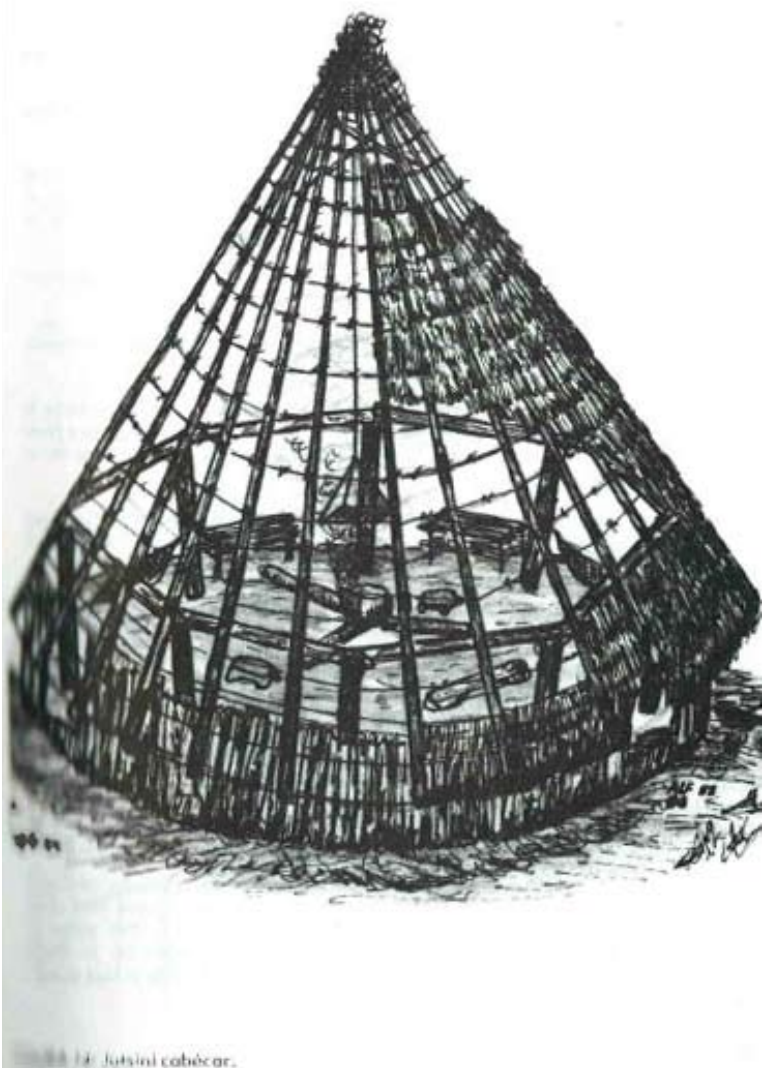
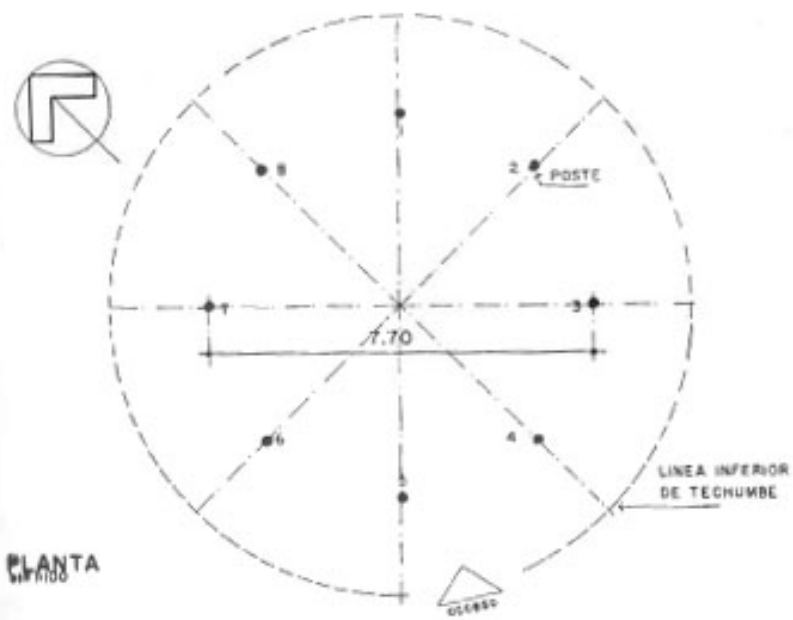


FIGURA 14: Jutsini cabécar.



Makara will serve as a setting for local arts and crafts fairs in order to engage



PLANTA

CASA DE LA CULTURA
En Cachabri

DISPOSICION ESTRUCTURAL EN CORTE

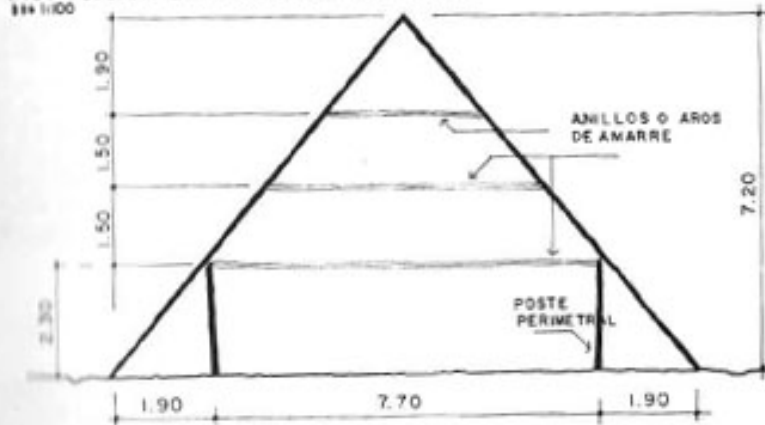
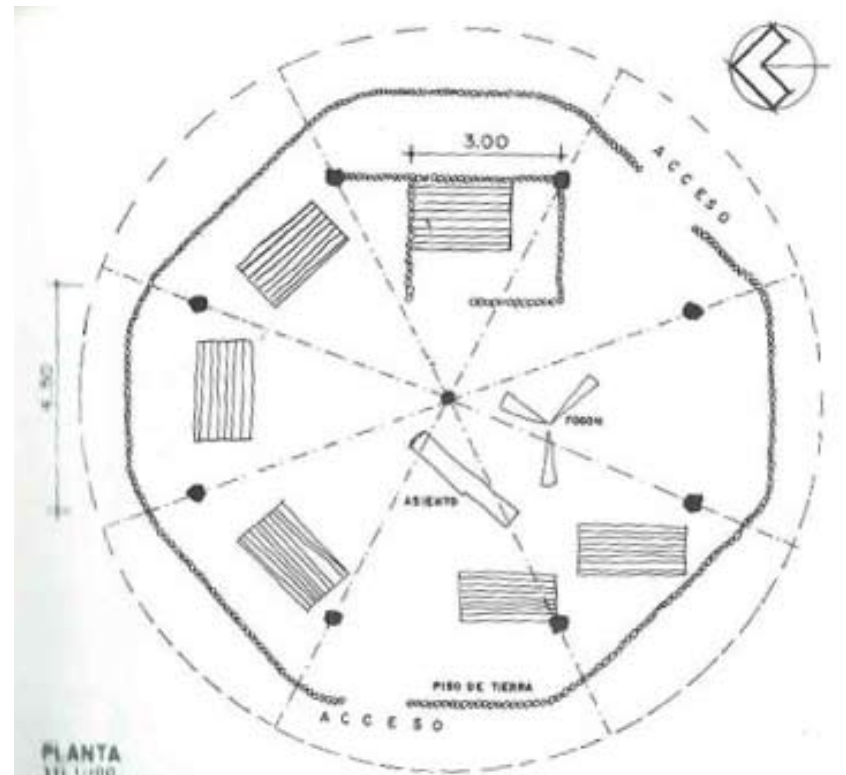


FIGURA 7. Casa de la Cultura en Cachabri.



PLANTA

VIVIENDA DE BASE CIRCULAR Y TECHO CÓNICO (CABÉCAR)

CORTE

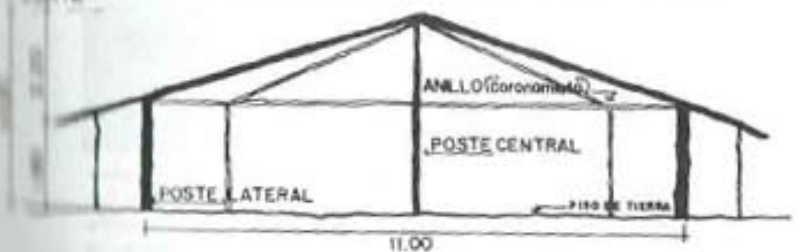


FIGURA 11. Vivienda de base circular y techo cónico (cabécar).



tourists with the local community and promote its economy.

Other Strategies

Primary Rain Forest

The property features more than 3 hectare of primary rain-forest which will turn into a preserve. All fields that are former farm land and not used for development will be reforested.

A local plant nursery will provide all plants and flowers to replenish the existing landscape. The use of local indigenous flora is an essential element in the overall strategy to secure the restoration of the rainforest as a complete ecosystem. It also intensifies the connection to the local community and economy by creating jobs.



Monkey Bridge

A Monkey bridge will create a corridor for animals to cross over highway and provide a connection between both parts of the property.



Living Wall

A large wall structure provides a shelter and barrier against the adjacent highway and will be built as a vertical garden to appear as if it is “living “ with greenery.



Down Lighting

The majority of lighting for all the exteriors and walkways are cut-off at 90 degrees to prevent uplighting. This creates an environment in harmony with nature and reduces energy consumption.



Sustainably Harvested Wood

Wood used in this project originates from sustainably harvested forests. These forests are certified by the Forest Stewardship Council, which sets high standards that ensure forestry is practiced in an environmentally responsible, socially beneficial, and economically viable way.

Most products that originate from certified sources consist of Pine species, which are versatile and can be used for structural exterior applications as well as interior cabinetry. Vendors in Costa Rica such as Xilo have used these woods to create laminated solutions and MDF based products that can be utilized widely in the project.



Featured Material

Synthetic thatch from sustainable materials (Palmex) provides for durability and low maintenance, while regular thatch requires yearly maintenance, houses insects, and is subject to other issues such as substantial accumulation of humidity.



Recycled Content Concrete

Almost 90% of Makara's structure is designed to be concrete block and poured in place concrete, manufactured using Holcim's local sources and quality procedures. Holcim is one of the world's largest environmentally friendly business operations and champion for sustainable construction.

Fly ash, a by-product of gypsum production, is used to substitute some of the cement within the concrete mix in order to lower the concrete's embodied energy.

Although recycled concrete could be imported, the embodied energy required to transport the material would put an enormous environmental burden in the project. Makara is designed to require the least amount of imported material as possible.

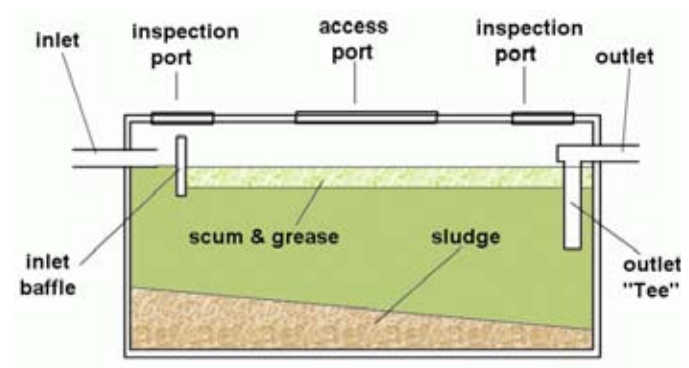


Water Use, Treatment, Irrigation

Makara's site plan is designed so that each villa and the restaurant can have a small septic system that manages gray and black water without compromising the overall impact on the site. This minimal intervention requires little maintenance and can be built by local builders.

A conventional approach to onsite water treatment would have had substantial negative impact to the current site, due to the proximity of the creek, the low elevation and required set backs for waste treatment plants.

A landscaping plan that will incorporate native species will require minimal irrigation during dry months due to the natural cycle of plants, minimizing the need for water re-use.



Indigenous Reserves

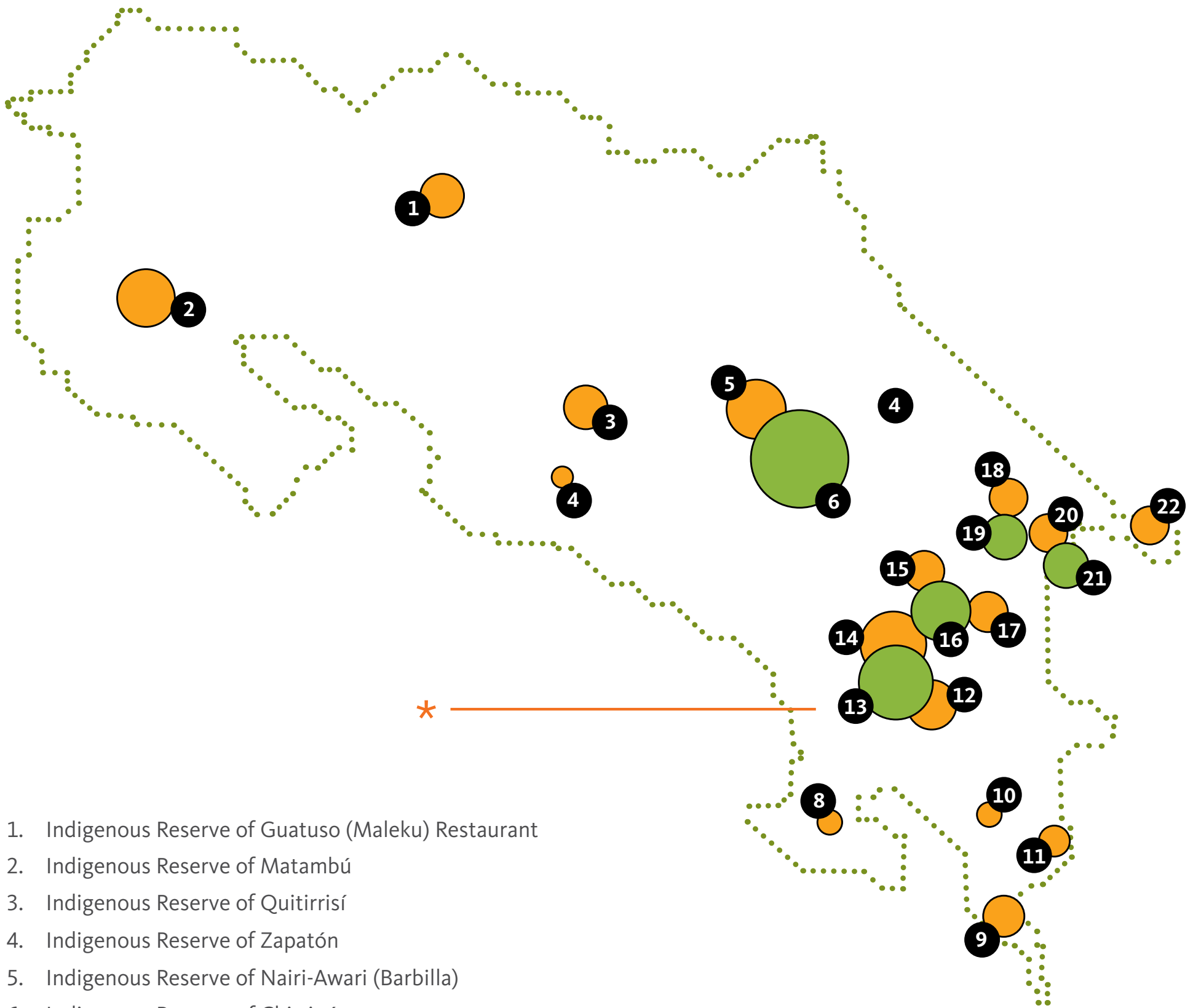
Bruncas | Borucas

This indigenous group will be at the core of Makara's community involvement. They are located in the Boruca indigenous reserve which consists of a mixture of various communities: the Center of Boruca, Rey Curre, which sets in the South Inter-American Expressway, the community of Changuena, and the community of Maiz and Bijagual, all of them in the county of Buenos Aires. The Bruncas have kept little or no resemblance of their ethnic features, its language has disappeared even with the efforts put forward by the University of Costa Rica. The economics of the Brunca people are based in agriculture; basic grains, pig farming and livestock. Their art expressions are mostly represented in textiles due their cotton crops, their color and paintings with vegetal inks and in the construction of good quality woodwork. They also work hard fruit shells like "jicaras" painted and decorated with sophisticated details that sell good in the local markets. The "dance of the little devils" is one of the strongest cultural manifestations taking place the 31st of December of every year. Makara's design draws identity from the traditional building forms and settlements of the Boruca tribe.

Other tribes in Costa Rica's South and South Central regions are the **Bribris**, **Guaymies** and **Térrabas**.



Indigenous Groups Of The Country



1. Indigenous Reserve of Guatuso (Maleku) Restaurant
2. Indigenous Reserve of Matambú
3. Indigenous Reserve of Quitirisí
4. Indigenous Reserve of Zapatón
5. Indigenous Reserve of Nairi-Awari (Barbilla)
6. Indigenous Reserve of Chirripó
7. Indigenous Reserve of Bajo Chirripó
- 8. Guaymí / Península De Osa**
9. Guaymí / Conte Burica
- 10. Guaymí / Coto Brus**
11. Guaymí / Abrojos Montezuma
12. Indigenous Reserve of Curré
- 13. Boruca Indigenous Reserve**
- 14. Térraba Indigenous Reserve**
- 15. Ujarrás Indigenous Reserve**
- 16. Salitre Indigenous Reserve**
- 17. Cabagra Indigenous Reserve**
18. Indigenous Reserve of TaynÍ
19. Indigenous Reserve of Telire
20. Cabecar -Talamanca
21. Indigenous Reserve of Bribri Talamanca
22. Indigenous Reserve of Kekuldi (Cocles)



