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33 MILLION
Earth upheld

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Earth Upheld

Site development and building methods that are sensitive to our environment and the human experience during the process of manufacturing, implementation, and that carry a sustainable outcome are at a critical point for consideration. This theme will incorporate the investigation of a site at all levels including public transit, landscape, building mass, building orientation, passive design strategies, use of natural lighting, renewable energy sources, leading to structure(s) that positively affect both the human experience and immediate and surrounding environment.



There are always questions about communities and what they need. The question that should be asked first before all others is, what defines a community? Is it the housing? Is it the economy? Is it the location and geography? What really defines a community? It is the people. People define a community and all that those people represent. A community is defined by the races, ages, religions, and even classes of its people. A community does not need politics, economy, and production to be defined as one. Some communities have been around for decades. Often these people come together unintentionally from tyranny, war, famine, and death. They are defined in communities called refugee camps or Internally Displaced Person camps. The oldest existing camp is over a decade, and consists of over a million people. Now how can a community that is brought together by tears and bloodshed be made into a thriving community? Maybe people who come to a refugee camp never leave until being forced out or moved to another situation much the same or worse. The conditions never seem to change. So the challenge is to take these already-formed communities and bring the people together other than only as refugees. To create housing that is not only sustainable, "green," and inexpensive but also life changing, and to bring to these communities what defines others, such as agriculture, sanitation (wastes, sewage and drinking water) economy, etc. The question is why a community that has been defined by its people cannot be seen as a community by others and themselves in a way that distressed communities have never been seen before.





As a result of war and natural disasters, there are millions of people who are displaced from their homes. Looking at those who are displaced because of political conflict within their own countries can reveal that hundreds of makeshift shanty communities are created. These communities are known as refugee or IDP camps, and are formed to create a place that is more than just a shelter, a place that is a home and safe. Camps are created by organizations, such as the UNHCR and Red Cross, and the people who are displaced themselves to create a community. It is a place to educate their children, a place to begin the process of regaining their independence and lives back from where they were once stolen.

There are six major areas of concern in present the day for displaced peoples, Iraq, Columbia, Democratic Republic of Congo, Thailand, Somalia, and Chad/Sudan. All the six countries meet the criteria for a possible site, so it is a matter of which country has the greatest need and the best opportunity for a design solution to be implemented. Through research on each of the six countries and the camps, it can be seen that there are six areas that come to attention that need to be addresses. These areas are housing, health-care, education, sanitation, security, and agriculture. The thesis of this project is that design and architecture can find solutions to these areas (while not being concerned with the political problems); and create communities that will not only improve the quality of peoples lives but give them the chance to thrive.

Introduction

The refugee and IDP (Internally Displaced Person) status of the world's people is on the rise. A crisis is spreading across the globe at an alarming rate. Currently there are 33 million displaced people in the world and millions killed and unaccounted for. Of the 33 million people there are 21 million IDP's and 12 million refugees. Refugees are people that flee their native country because of politics, economics, religious views, and natural disasters. There are millions left homeless and seeking refuge. IDP's usually flee their homes for the same reason as refugees, but they do not leave their native country. The leading cause for refugee or IDP status is political and religious persecution of a country's own people. Civil war and genocide have torn countries into pieces with little hope of peace in the near future. In these situations typically all civilians are caught up or targeted by the violence. Age, race, sex or creed do not really matter, but they are often used as an excuse or explanation to events that have or are currently taking place to avert people's eyes from the truth to what is happening.

There are six major areas in the world in which the refugee crisis is happening and being looked over by outsiders. Columbia, the Democratic Republic of Congo, Thailand, Iraq, Somalia, and Darfur (Chad/Sudan) are the current countries with a refugee and/or IDP crisis. Refugees and IDPs are not the only people that suffer from political, economic, or social unrest; the countries that play host to refugees suffer from the burden that is placed upon them. The host country's governments are to not only guarantee the basic human rights but physical security to refugees and even IDPs. Countries may not forcibly return refugees to a territory where the people face danger, nor discriminate among groups of refugees. Refugees should also receive at least the same rights and help as any other person who is a legal resident, including freedom of thought, from torture, and from degrading treatment. Refugees should have access to medical care, schooling and the right to work. There are countries that maintain an open door policy, but it comes at a cost. Refugees get charged for basic needs such as food and water and also for basic medical care but, they are not allowed to work inside the country and fear being

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they are unable to pay. Developing countries with a per capita income of less than \$2000 host more than two-thirds of the world's refugees, while nations with a per capita income of over \$10,000 host only four percent. The developing host countries do not have the funds nor the resources to care for the refugees, while the countries that have the funds and resources do send help but will not in most cases become host countries themselves and do not provide assistance other than some food and medical supplies. Because of the unrest of most countries that refugees are native to, more than 7 million refugees have been "warehoused" for ten years or more, are never seen as more than a refugee, and thus have no rights. While other refugees such as 400,000 Sudanese and 2 million Afghans, have stayed in camps and other temporary shelters for more than 20 years.

Refugee camps are designed to be a temporary solution to political, economic, social or religious issues that develop and put civilian lives in danger. The problem with refugee camps is that they are seen as only temporary and only provide basic needs if and when possible. But when the unrest of a country cannot be resolved people can become lifelong refugees, and a crisis arises out of the temporary "cities" when they begin to become permanent "cities."

Defining the Problems

Because the idea of the purpose for refugee and IDP camps and the reality that results clash, a crisis arises. How does one create a place, shelters, a community that is meant to be temporary but is durable, sustainable and has the feeling of permanence, for the months and years that people might inhabit it? How can architecture and design improve the quality of refugee and IDP lives within the camps? These are two very simple questions with no easy or simple answers.

To begin to answer the first question one must study and examine the camps in Columbia, the Democratic Republic of Congo, Thailand, Iraq, Somalia, and Darfur (Chad/Sudan). There are six areas of concern within in the countries and the camps. These six areas are housing, health-care, education, sanitation, security, and agriculture. Each of these areas there is neglect of the systems in place or there the lack of

systems to address these issues.

The housing for refugees is most often supplied by the UNHCR, for families of 6 - 10 people but because of overcrowding, as many as 15 - 20 people live in these structures. The ones lucky enough receive tents find that these tents only last a few months because they degrade and fall apart due to winds and hot humid air. Most refugees do not receive any form of a housing structure, instead building a shelter out of whatever materials they can find, such as cardboard, wood, scrap metal, plant life, plastic bags, and even garbage. Clinics and hospitals usually fare better because other organizations, such as the Red Cross and Doctors Without Borders, supply tents for their structures and medical supplies when and where possible. The locations that humanitarian organizations cannot get to because of weather or conflict are in areas that, unfortunately, rely on the host country's government to supply the refugees with basic care. Even when governments send aid humanitarian organizations offer help the structures and medical care are beyond inadequate for the refugees' needs. As for education facilities, teachers, and supplies, there is little to no assistance that any organization provides. With each new community that is formed, the people build the schools, and the people find a way to teach and educate their children in the hope of giving them a better future. Latrines are for control of human wastes. Several problems have arisen out of the design for latrines. First, not all people know how to use a latrine, and the lack of knowledge hinders their use. Second, the use of certain materials and upkeep of the latrine has also hindered people's use. Third, there is the amount increase in the number of flies and the spread of diseases. Other issues that deal with sanitation are control of animal wastes because some refugees are nomadic and not used to being stationary, and the presence of clean drinking water and distribution of that water. The only security that exists in refugee and IDP camps is armed guards, and rarely are they present. Agriculture is not considered in the design for camps; there is supposed to be markets designed into camps, yet that are no agricultural areas for production of food and other materials, which can be used for construction and as a source of income.

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Along with housing, health-care, education, sanitation, security, and agriculture being neglected within the camps, there is also a neglect in camps design and structures. For example, most, but not all, designs for housing seem to ignore some very basic ideas. First, the culture of the people is not taken into account. Second, the geography and landscape is often ignored. And third, the systems and materials found in the regions are not implemented or developed. There seems to be a quest for a universal design solution that could be used anywhere and everywhere across the globe for refugees or any displaced person. The problem with a universal design solution for shelters is that the world is not the same everywhere, and what might work in Russia would not work in Africa. There could be universal ideas and methods for forming a design solution, but not for a design itself.

Designing an entire camp may not be feasible in great detail for each of the six areas, but there would be overlap and each area would be developed, some more than others. There have been some that have said that designing a new refugee or IDP camp is not a good direction to head in because it has been done before. The response to those critics is that there have been attempts to design successful refugee camps, but none have been implemented and sustained. Furthermore, why would anyone redesign a school, church, or even a house, when it has already been done successfully thousands of times?

With the second question that arises on how can architecture and design improve the quality of refugee's and IDP's lives within the camps, there are a few preconceptions to discuss. There are some that believe that when people such as refugees that are trying to survive and protect their families from danger that it does not matter what the shelter looks like. Why do refugees not deserve to have housing that is not just a shelter, that not only provides protection from the elements but also protection for personally safety; that can reflect the culture of the people, the climate and geography of the land, but also the history and traditions of the people?

If refugees are treated as more than refugees and given a chance

thrive their lives can be drastically changed.

Emergence for Change

If refugees were given more opportunity to take control over their own survival, aid could be put to use in other areas. For example, if a camp was able to grow a portion of their own food supply, then the aid could be sent to other areas, such as medical supplies, or the money could be transferred to another section such as education of the people. Another example would be if the people could grow the supplies need to build shelters and be able to construct them themselves.

Camps are designed and organized so that the people who in habit them are completely dependent on the host country or other humanitarian organizations to provide aid and assistance. The camps are not designed to allow for the development of personal, social, or economic growth. Most countries that host refugees do not have means to supply the basics needs of the people, but also do not allow the refugees to be anything other than a refugee. Such as in Chad where refugees cross the border from Darfur, they are not allowed to work and provide an income for their families. These people rely completely on Chad's government and humanitarian organizations to provide food, shelter, and medical care. Because Chad itself is a poor country and cannot sustain its own people, and economy most of the time the refugees have to scavenge for whatever resources they can find within the confines of the camps.

The Darfur states is a region of Sudan in central African that is experiencing a mass ethnic cleansing or better known as a genocide of the African tribes. The government of Sudan has used an Arab tribal group called the Janjaweed the carry out the mass genocide. The Sudan government has also supplied the Janjaweed with the means to carry out the attacks such as, horses, guns, helicopters, and bombs to destroy entire villages. There has been a continuous conflict for over 20 years. The citizens of Sudan are stuck between a rock and a hard place. They are unable to return home but are forced to remain refugees in a given country

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in the hope that another country will give them an asylum or they are able to go home. With this in mind the refugees from Darfur need communities that they can not only survive in but can thrive and have a future not only for themselves but for the next generations. There are children that have lived in camps their entire lives. A refugee camp is not to be a new home but it does not need to feel like a prison.

To begin to develop a solution a person must look at not only what the natural landscape has to offer, but the culture of the people, and the people themselves for solutions. Using these points as a place to start creates a foundation of a successful design for a sustaining refugee camp.

Responding to the Site

Darfur covers an area of about 200,000 square miles of land in Sudan along the Chad border. The land in Darfur consist of four main features. First the eastern half of Darfur is covered with what is known as goz. Goz consists of sandy plains and low sandstone hills. The region is often waterless and can only be inhabited with access to water but with the lack of water the land can support rich pasture land. North of the goz region is covered with the Sahara desert. The second feature is a range of seasonal watercourses that flood during the wet season, known as a wadis. The soil in this region is rich but is very difficult to cultivate. The third feature to Darfur is basement rock. Basement rock is not fertile enough to cultivate but it can provide some forest cover that can be used as a grazing area for animals. The fourth feature is the non active volcanic Marrah Mountains. This mountain range was created by a massif, where there is a small area of temperate climate, high rainfall, and permanent springs of fresh water. The rainy season lasts from June to September. Much of Darfur consists of agricultural production. The main crop is pearl millet, that is harvested in November and after the harvest, the dry stalks are used to feed the live stalk. In some regions of the country years may pass between rainfalls and in other regions the average rainfall is 700 millimeters, leaving half the country covered in desert conditions and others with lush forests.

Temperatures can reach to 115 degrees Fahrenheit in the day and reach lows of 40 degrees Fahrenheit at night. The African geography and climate offers many challenges to overcome but it also offers the opportunity to design creative solutions to the situation specific to the Darfur states.

There are systems and materials that are local to the region but also local to African that can be used and built upon to develop the culture of the communities even further. There are systems and that are native to Sudan and Chad and there are systems or materials that are but are native to Africa that can be implemented in Sudan and Chad. An example of systems or materials that are native to the region are straw or mud bricks, thatch, and goats. An example of systems and materials native to African but not used in the region are bamboo and rice. Introducing new materials and systems that not only work in the region but they can help the people thrive in refugee communities. Developing upon the materials and systems in place not only brings the people's culture into the design but brings hope and the vision that they are not seen as just refugees but seen as people.

For example, there are about 1000 species of bamboo and are found in diverse climates, from cold mountains to hot tropical regions, including in the sub-Saharan Africa. New shoots of some of the larger species can grow over one meter per day. The shoots, new bamboo culms that come out of the ground, are edible. They are used in numerous dishes and broths. The sap of young stalks tapped during the rainy season may be fermented to make ulanzi, a sweet wine, or simply made into a soft drink. Bamboo is used in medicine for treating infections. It is also a low calorie source of potassium. The empty hollow in the stalks of larger bamboo is often used to cook food in many cultures. When treated, bamboo forms a very hard wood which is both lightweight and exceptionally durable. In tropical climates it is used in elements of house construction, as well as for fences, bridges, toilets, walking sticks, canoes, tableware, furniture, chopsticks, food steamers, toys, construction scaffolding, as a substitute for steel reinforcing rods in concrete construction, hats, and

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martial arts weaponry, including fire arrows, flame throwers and rockets. Bamboo is also widely carved for decorative artwork. Bamboo canes are normally round in cross-section, but square canes can be produced by forcing the young culms to grow through a tube of square cross-section slightly smaller than the culm's natural diameter, thereby constricting the growth to the shape of the tube. The fiber of bamboo has been used to make paper in China since early times. The wood is used for knitting needles and the fiber can be used for yarn and fabrics.

Another example is the use of goats. Domestic goats are one of the oldest domesticated species. For thousands of years, goats have been used for their milk, meat, hair, and skins. A goat is useful to humans both alive and dead, first as a renewable provider of milk and fibre, and then as meat and hide. Some charities provide goats to farmers and families in poor countries, because goats are easier and cheaper to manage than cattle. Some goats are bred for the fiber from their coats. Most goats have softer insulating hairs nearer the skin, and longer guard hairs on the surface. The desirable fiber for the textile industry is the softer hairs, and is also known as mohair, fleece, goat wool, or cashmere. The fiber is made into products such as sweaters and doll's hair. Both cashmere and mohair are warmer per ounce than wool and are not scratchy or itchy or as allergenic as wool. Both fibers command a higher price than wool, compensating for the fact that there is less fiber per goat than there would be wool per sheep. The longer guard hair has been discovered to act as a rain barrier. When the hair is woven and becomes wet the fibers swell and becomes tight creating a solid material. Goat skin is still used today to make gloves, boots, and other products that require a soft hide. Other parts of the goat are also equally useful. The intestine is used to make "catgut" that is used as a material for internal human sutures. The horn of the goat is also used to make spoons among other things. Rarely, goats will be used as light pack animals and to draw small carts. Many farmers use inexpensive goats for brush control, leading to the use of the term brush goats.

Conclusion

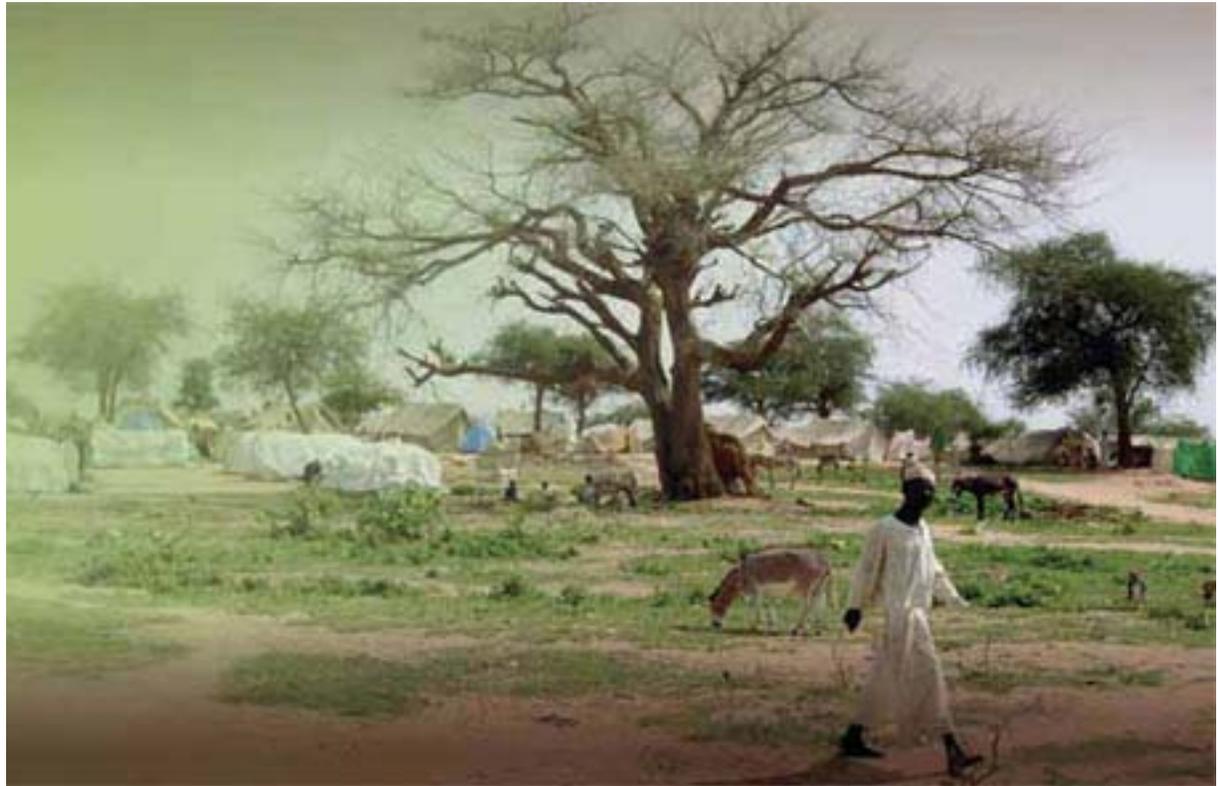
With the rise of the refugee and IDP (Internally Displaced Person) status around the world not only has an opportunity arose but a cry for help has been made. Through design and innovation the lives of people whom are forced to live in camps have a chance at some kind of a normal life where their families can thrive. The course of the book is to explore the multitude of possibilities and research completed to begin to provide a means to an end to the devastation that is affecting millions of the world's people

33 MILLION

Lives to

change

Precedent/Site Analysis



25 Columbia

29 Democratic Republic of Congo

33 Thailand

37 Iraq

41 Somalia

45 Darfur (Sudan)

Colombia



Colombia

Colombia is a country located in the northwestern region of South America. It is the twenty-sixth largest nation in the world and is the fourth largest in Africa. The country continuously suffers from a low-intensity conflict involving rebel guerrilla groups, paramilitary militias, and drug trafficking. The conflict began in the mid 1960's when the Revolutionary Armed Forces of Colombia and the National Liberation Army were founded to counteract the campaigns of the Colombian government.

Colombia currently has the second highest number of Internal Displaced Persons. Over 3 million people have been affected by over 50 years of conflict and violence. In the slums located outside the major cities of Colombia, thousands are displaced from their homes. The people have limited access to medical care. The Colombian government does provide free health-care for those who are registered as Internally Displaced Persons, but only a minuscule amount of people actually register. The people fear that revealing their personal information will get to those that they have fled from.

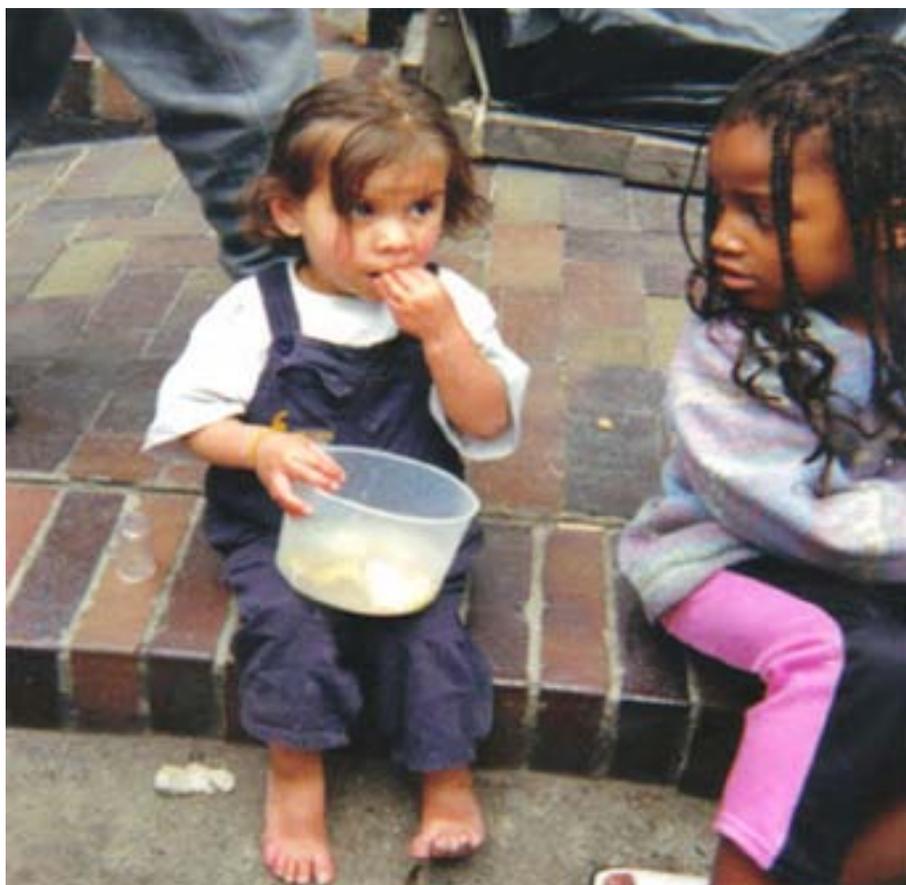


A young woman peers out of a shanty hut in Colombia while a person is being burned.

In many areas there is a continuous conflict and in many cases people cannot avoid the violence by both government and anti-government forces. These agencies consider people as spies for other organizations. With the constant conflict over land the villagers are caught in the middle of the fighting, often unable to escape. As various armed forces fight for control over these lands they use violence and intimidation to control the civilians living there.

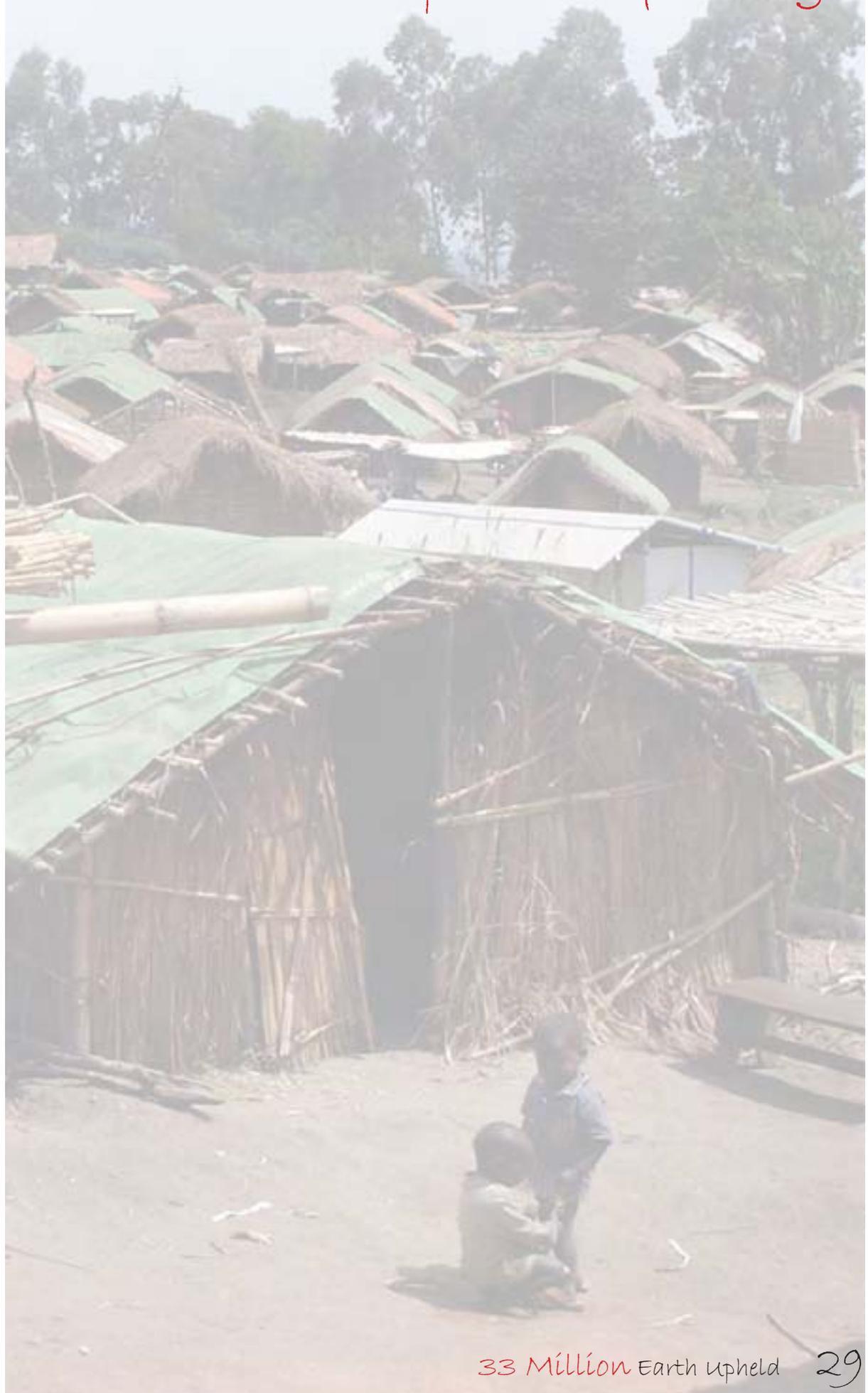
Colombia has become notorious because of its cocaine production and for its kidnapping and mysterious disappearance to those people that oppose these crimes. There are 62 murders per 100,000 people and between 1992 and 1999 a total of 5,181 kidnappings occurred in Colombia because of the narcotics trade.

For those who try to provide assistance to the IDP's, such as Doctors Without Borders, the UN, and Red Cross, they are often derailed from providing the assistance that is much needed. Patients have been forcibly removed from ambulances and executed, and medical facilities are repeatedly looted. Because of the constant fear for safety and well being there is also the over whelming concern for the mental health of those affected. Sadly there is no assistance to help the people deal with their psychological needs.



Two young displaced girls are eating their daily rations of food in a refugee camp.

Democratic Republic of Congo



Congo



Billboard from presidential election in the Democratic Republic of Congo.

The Democratic Republic of Congo is the third largest country in Central Africa. Though located in the Central African it is economically and regionally associated as a member in the Southern African Development Community.

DRC is emerging from of years of conflict and war that has caused millions of its people to be victimized. Democratically elected officials are now in place and areas are experiencing relative calm. However, Congo's people still experience daily victimization in vast areas. The people living in North Kivu, South Kivu, Katanga, Ituri, and Kinshasa are victims of rape, torture, arson and looting by militant armies.

Not only have villages been destroyed but agricultural lands in places that reach across the country side. Villagers are often forced to sleep in the bush and return home in the morning for the fear of being caught and victimized in the constant conflict. Men, women, and children are captured, sexually abused and often become sex slaves, while others are tortured and killed.



A women refugee from the Congo.

7,366 cases of rape was reported between May 2003 and June 2007. This is only a fraction of the actual sexual assaults committed in Congo. The victims of sexual abuse more often than not only do not seek any medical or mental health treatment they also do not report cases of sexual violence. The lack of knowledge about appropriate medical care delay or discourage them. There is also a fear of bringing shame to the families of the rape victims and also the rejection from not only the families but from society as well because of the stigma of shame that the victims bring upon the families.

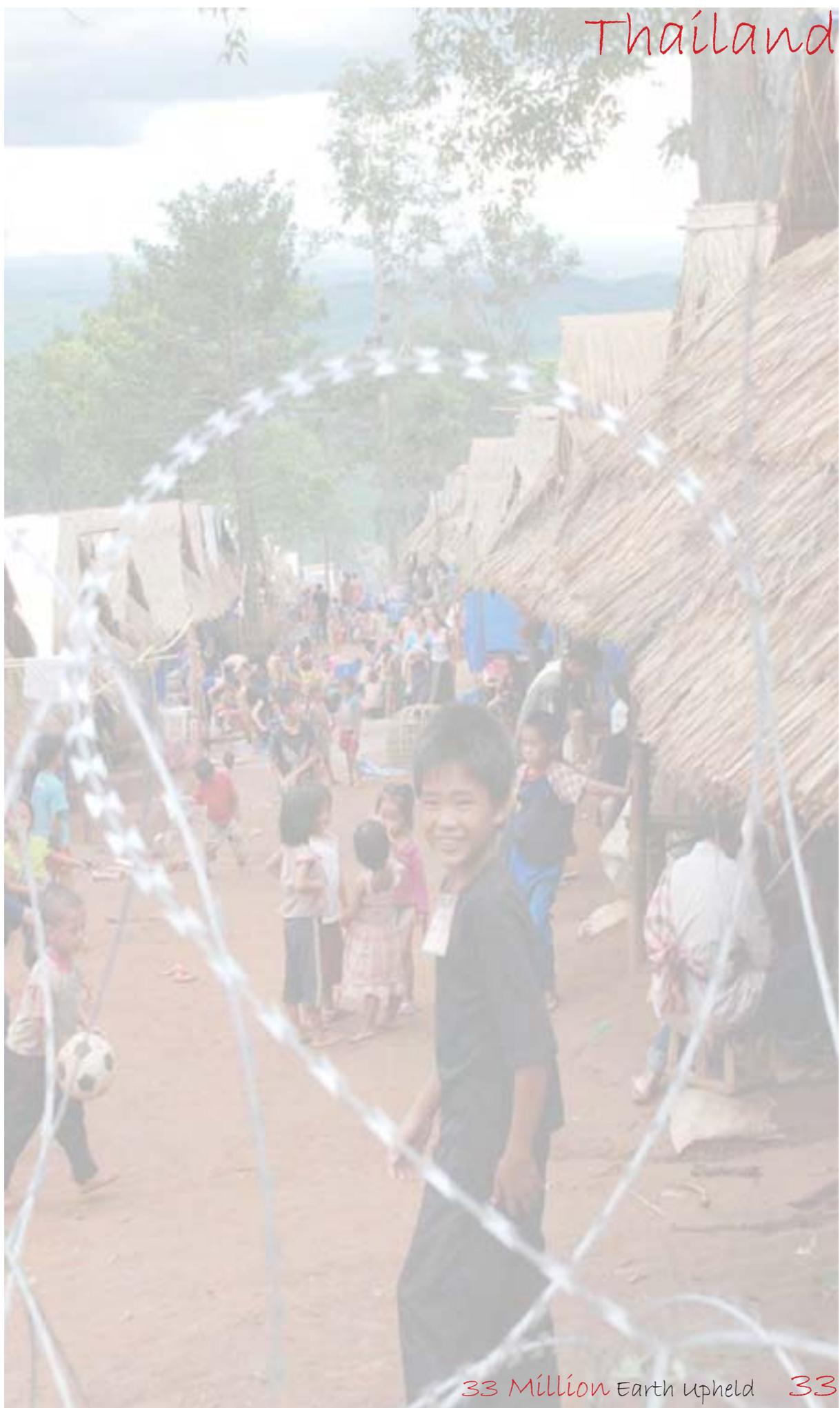
There are hundreds of severely malnourished children, victims of sexual violence, and outbreaks of meningitis, malaria, cholera and measles. Aid organizations, such as Doctors Without Borders, are currently treating and vaccinating hundreds of thousands in the Congo.



Above: An image of the typical living conditions of IDP camps (tent cities) in the Democratic Republic of Congo.

Right: An image of women and children waiting for daily water rations, sometimes waiting for hours and carrying gallons for each family member.





Thailand



An image of a Hmong refugee camp in Thailand.

The Hmong are a group of people originating from Southern China who have sought refuge in Vietnam, Laos, Thailand and Myanmar because some of the Hmong population in Laos assisted the U.S. military in fighting against the Communist forces during the U.S. Vietnam war.

After the Communist takeover of Laos, the Hmong were persecuted by the government. The Hmong people fled to neighboring countries of Vietnam, Thailand and Myanmar. Thailand is a country located in Southeast Asia. About 8,000 Hmong, since 2005, have sought refuge in the village of Huay Nam Khao in Thailand. Many of the people claim to have fled targeted attacks on their villages. They also claim to live in fear in Thailand because of political or religious persecution in Laos. The Thai government has not allowed United Nations High Commissioner for Refugees (UNHCR) to assist the Hmong refugees in Huay Nam Khao.

The government regards the Hmong people as immigrants and not refugees. With no refugee status they have no right to protection under international law, same as they would be as Internal Displaced Persons.

The Thai government has been deporting the Hmong refugees upon entry into Thailand back to Laos. The Thai government also intends to deport the 8,000 Hmong in Huay Nam Khao back to Laos. Because of the Thailand government actions against the Hmong people many are seeking shelter in the jungles with little hope for survival.



School children receiving supplies from the UN.



A group of school children, mostly orphans living in a refugee camp in Thailand.

Iraq



Iraq

The Republic of Iraq is a country located in the Middle East. Since the war on terrorism beginning in an 2003, military forces, mainly American and British, and a few other organizations have occupied Iraq. The invasion has created a multitude of erupting problems such as increased civil violence, the removal and execution of Saddam Hussein. There is also country wide problems in the political development, stabilizing the economy, and battle over oil reserves and mining fields.

Currently the Middle East has the highest number of refugees. There are 4.2 million Palestinians, Afghans and Iraqis. The UN estimates over 4 million Iraqis have been displaced since the start of the war. Over 2.2 million people have fled from their homes, since 2003, for safer areas within Iraq. Another 1.5 million people have escaped to Syria, and over 1 million refugees are now living in Jordan, Egypt, Lebanon, Yemen, and Turkey.

Many Iraqis have been or are being targeted because of religious beliefs, economic status, and even profession. Syria and Jordan are rapidly becoming overwhelmed by the numbers of Iraqis seeking refuge and are beginning to feel the economic burden from their neighbors to support and care for the people.



Young refugee children outside their tent in Jordan.

Right: Young orphan children in front of their tent at a refugee camp.



Left: A family is fleeing Iraq from bombings and areas being destroyed by fire.

Jordan, Lebanon and Syria consider Iraqis as “guests” rather than refugees but this status has taken its toll on these countries and the Iraqi people are beginning to feel the burden that has been placed on them.

Also none of the countries that the Iraqis have fled to for refuge will not allow them to work, but they also have begun imposing restrictions on the refugees, such as charges for health care that used to be free. While still keeping the idea of an “open door policy”. Such as in Jordan, refugees have to pay for the most basic services, and also live in constant fear of deportation because they are unable to earn an income to pay for these services.

Many Iraqis resent the treatment the Palestinians received under Saddam Hussein’s regime. As a result of this treatment, gorilla and militant groups have singled out Palestinians as recipients of the “fatwa” (or death sentence).

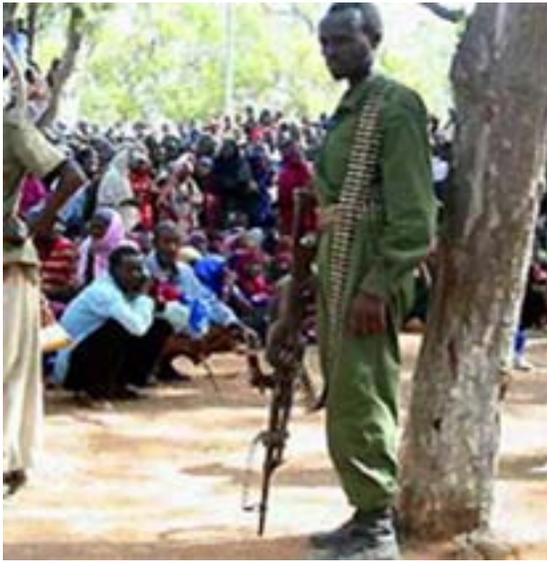
The UN High Commissioner for Refugees cannot provide adequate protection and assistance to the people. Also they receive very little support from other UN agencies that seem slow to acknowledge the extent of the crisis. The fact that Lebanon, Syria and Jordan are not state parties to the 1951 Refugees Convention further reduces UNHCR’s ability to protect refugees residing in these countries.

Somalia



Somalia

Somalia is officially known as the Somalia Republic located in East Africa. The Somalia government is weak and has no central authority over the country, but the government that does exist is recognized throughout the country. There is only some governmental control in specific regions by the Transitional Federal Government (TFG). In the southern regions of Somalia the TFG has no authority and there is no other form of authority that exists. The only form of an organized control over the region is from various tribal militias that battle over the region for dominance. Violence and civil war has plague the country in the central regions since early 1991 when the president Mohamed Siad Barre was forced out of office.



Government soldier.

Somalia is ranked in the lowest tier for its peoples health care and general living conditions. One-quarter of children in the country die before the age of five and the average life expectancy is forty-seven years old. Throughout the current calendar year (2007) there has been increased violence including bombings and gunfire.

Violence across the region has also caused hundreds of thousands of people to flee leaving their homes and lands behind. It is estimated that 20,800 families have fled throughout Somalia with thousands more leaving daily.



Rebel soldier.

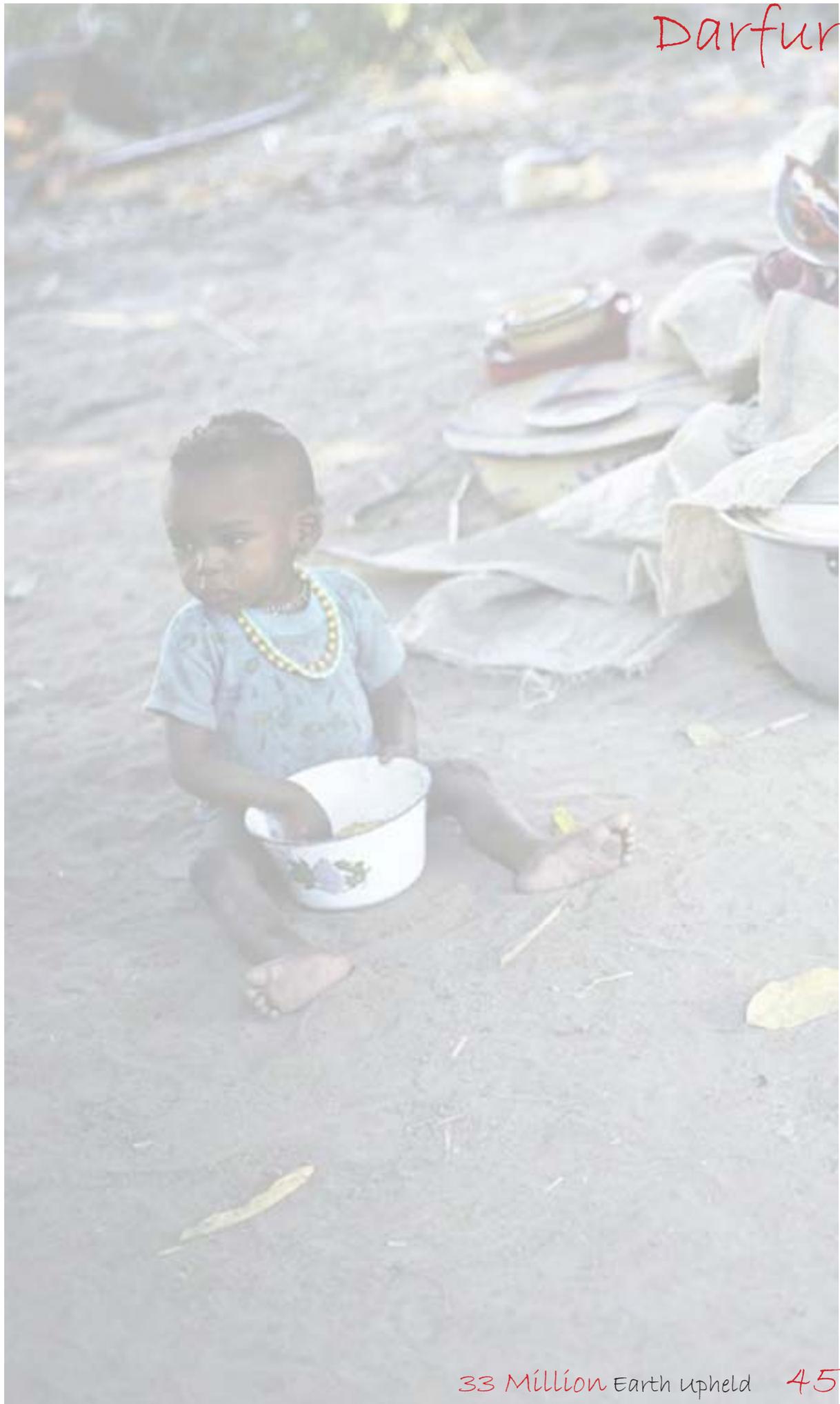
Along with Somalia being ranked as one of the world worst health care and living conditions it is also one of the world's poorest countries. Not only does the country lack the ability to provide adequate food but also infrastructure and social integration infrastructure such as transportation and health care facilities for its citizens.



Refugees collecting water for the families daily rations.

In a country with limited land and fuels and is visited fairly often by drought or flash floods, refugees need to be able to contribute to their own life support. Also with food and medical supplies being looted there is little hope is remaining in the people for survival, let alone a return home.

To sustain the refugee population even at a low level required regular contributions from other countries, an adequate distribution system, and contribution by the refugees themselves to their own survival.



Darfur

Most of the people uprooted by the ongoing genocide in Sudan are Internally Displaced Persons. The current highest number of IDP's in the world are from the Darfur states within Sudan at over 5 million people and there are over 150,000 refugees that have escaped into Chad.

Three tribes have been targeted (the Fur, Masalit, and Zaghawa) in an attempt for ethnic cleansing by the Government of Sudan (GOS). The three main groups that are targeted are also the three main rebel groups of the Fur, Masalit, and Zaghawa tribes. These forces formed the Sudan Peoples Liberation Army. The rebel organization has been fighting with the Sudan government in the south of Sudan for over 20 years. For years the GOS has used peace negotiations as a cover to complete the governments plan of a total genocide. The government is also using old tribal feuds as a reason to the ethnic cleansing and deny the governments involvement stating it is tribal wars.



A bound skeleton found in the desert.



A body of a man found after a helicopter attacked a village.

The Sudan government hired an Arab tribe called the Janjaweed to carry out the ethnic cleansing and to hide behind the killings as tribal feuds. The GOS states that the Janjaweed took it upon themselves to remove the black Africans from the Darfur states of North Darfur, West Darfur, and South Darfur.

The Janjaweed have burned Mosques and entire villages. Men, women, and children are killed and their herds were taken. Women and children have been raped and the bodies were dumped into open wells to poison them.

Waves of refugees and IDPs pour into camps hours after each attack by the Janjaweed and government soldiers. In some situations refugees and IDPs have only 1 1/2 gallons of water per person per day but in normal conditions the people are given 5 gallons. This is one day's worth of drinking, cooking, and bathing water. The average person in the US uses about 100 gallons of water per day for drinking, cooking, bathing water, and other activities.

Below: An IDP camp bulldozed.



Above: Aerial photo of a destroyed village in Darfur.

Documentation of Analysis



Documentation of Analysis



53	Site Criteria
55	Site Possibilities
57	Site Selection
73	Site Analysis

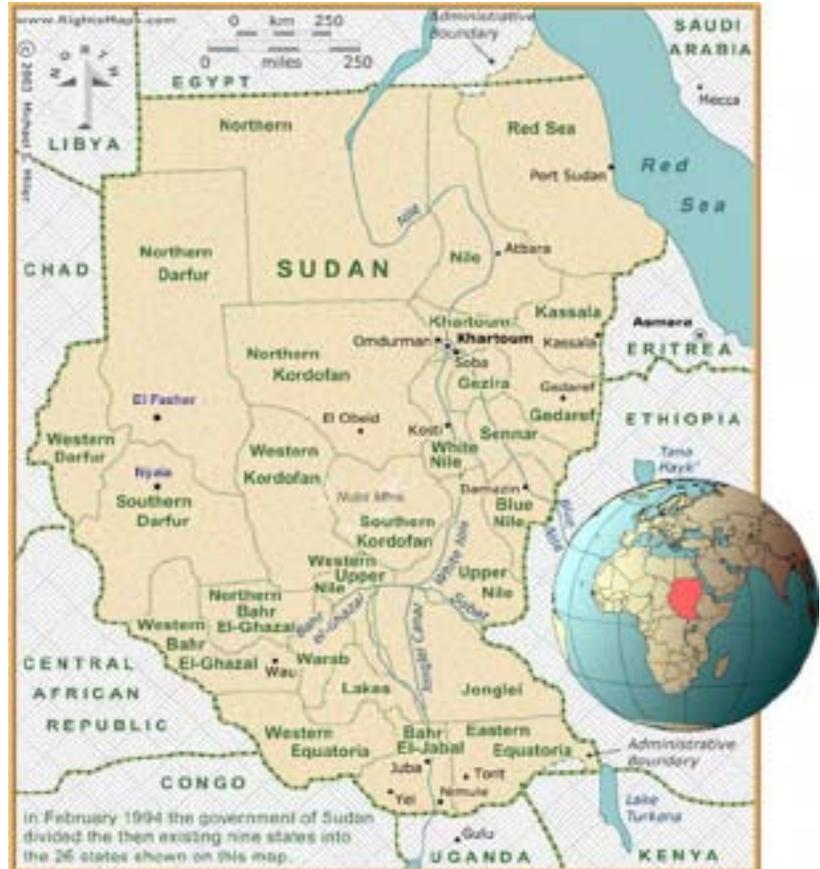
- A region uprooted by religious or political persecution, war or natural disaster.
- People displaced as a refugee or IDP.
- Communities living as refugee camps or IDP camps.
- Communities that have been forged by people but is lacking the infrastructure.
- Communities receiving little to no outside assistance.
- Living conditions that do not meet or barely meet basic living standards.

Worldwide

- 700 Registered refugee and IDP camps.
- 12 million registered refugees.
- 21 million registered IDP's.
- Millions missing and unaccounted for.
- 6 major areas of concern for refugees and IDP's:
 - Columbia
 - Democratic Republic of the Congo (DRC)
 - Thailand (Hmong)
 - Iraq
 - Somalia
 - Darfur (Sudan)

Darfur (Sudan)

- The conflict is a crisis in the Darfur states of Western Sudan.
- The conflict is described as both "ethnic cleansing" and "genocide".
- The highest number of IDPs in the world are in Sudan with more than 5 million people.
- There are currently over 300,000 refugees seeking shelter in the neighboring countries of Chad, Libya, Egypt, and Ethiopia.



Site Selection

Geography and Climate

Darfur is in the eastern region of Sudan covering an area of about 200,000 square miles along the Chad border. Darfur is an region of three states of North Darfur, West Darfur, and South Darfur. Sudan is located in central Africa and the main towns in the region are Al Fashir, Nyala, and Geneina.

The land in Sudan specifically in Darfur consists of four main features. First the eastern half of Darfur is covered with is known as goz. Goz consists of sandy plains and low sandstone hills. The region is often waterless and can only be inhabited with access to water or a permeate well. With the lack of water the land can support rich pasture and land. North of the goz region is covered with the Sahara desert. The second feature is a range of seasonal watercourses that flood during the wet season known as a wadis. The soil in this region is a rich soil but is very difficult to cultivate. The third feature to Darfur is basement rock. Basement rock is not fertile enough to cultivate but it can provide some forest cover that can be used as a grazing area for animals. The fourth feature is the non active volcanic Marrah Mountains. This mountain range was created by a massif, where there is a small area of temperate climate, high rainfall, and permanent springs of fresh water.



Deriba Crater in the Marrah Mountains.



Darfur Baobab trees.



Sahel of Sudan with savannah vegetation.

The rainy season lasts from June to September. Much of Darfur consists of agricultural production. The main crop is pearl millet, that is harvested in November and after the harvest, the dry stalks are used to feed the live stalk. Goats are the major live stalk industry in the region. In some regions of the country years may pass between rainfalls and in other regions the average rainfall is 700 mm, leaving have the country

Site Selection

History

Darfur is to have been part of the urheimat of the Proto-Afro-Asiatic language in distant prehistoric times, though there are numerous other theories that exclude the Darfur states.

The early history of Darfur is dominated by the influence of the Jebel Marrah. Most of the region is a semi-arid plain and cannot support a large and complex civilization. The Marrah Mountains offer plentiful of resources. The Daju people created the first known Darfurian civilization based in the mountains, though they left no records besides a list of kings. The Tunjur displaced the Daju in the fourteenth century and introduced Islam. The Tunjur sultans intermarried with the Fur and sultan M. Solaiman is considered the founder of the Keira dynasty. Darfur became a great power of the Sahel under the Keira dynasty, expanding its borders as far east as the Atbarah River and attracting immigrants from Bornu and Bagirmi. During the mid-18th century the country was raged by conflict between rival tribes, and external war with Sennar and Wadai. In 1875, the weakened kingdom was destroyed by the Egyptian government largely through the machinations of Sebehr Rahma, a businessman who was competing with the dar over access to slaves and ivory in Bahr el Ghazal to the south of Darfur.



Left: children fleeing after government soldiers attack their village.



Right: The refugees in Darfur need shelter, protection from sun, wind, rain, and bugs. Some are forced to live in the open, maybe under a few trees and scrap material.

The Darfurians were controlled under Egyptian rule. When Abdallahi ibn Muhammad succeeded Ahmad's he demanded that the specific tribes provide soldiers for the ruling governments military. Several tribes rose up in revolt. These tribes were able to overthrow Abdallahi at Omdurman in 1898 by a British force, the new Anglo-Egyptian government recognized Ali Dinar as the sultan.

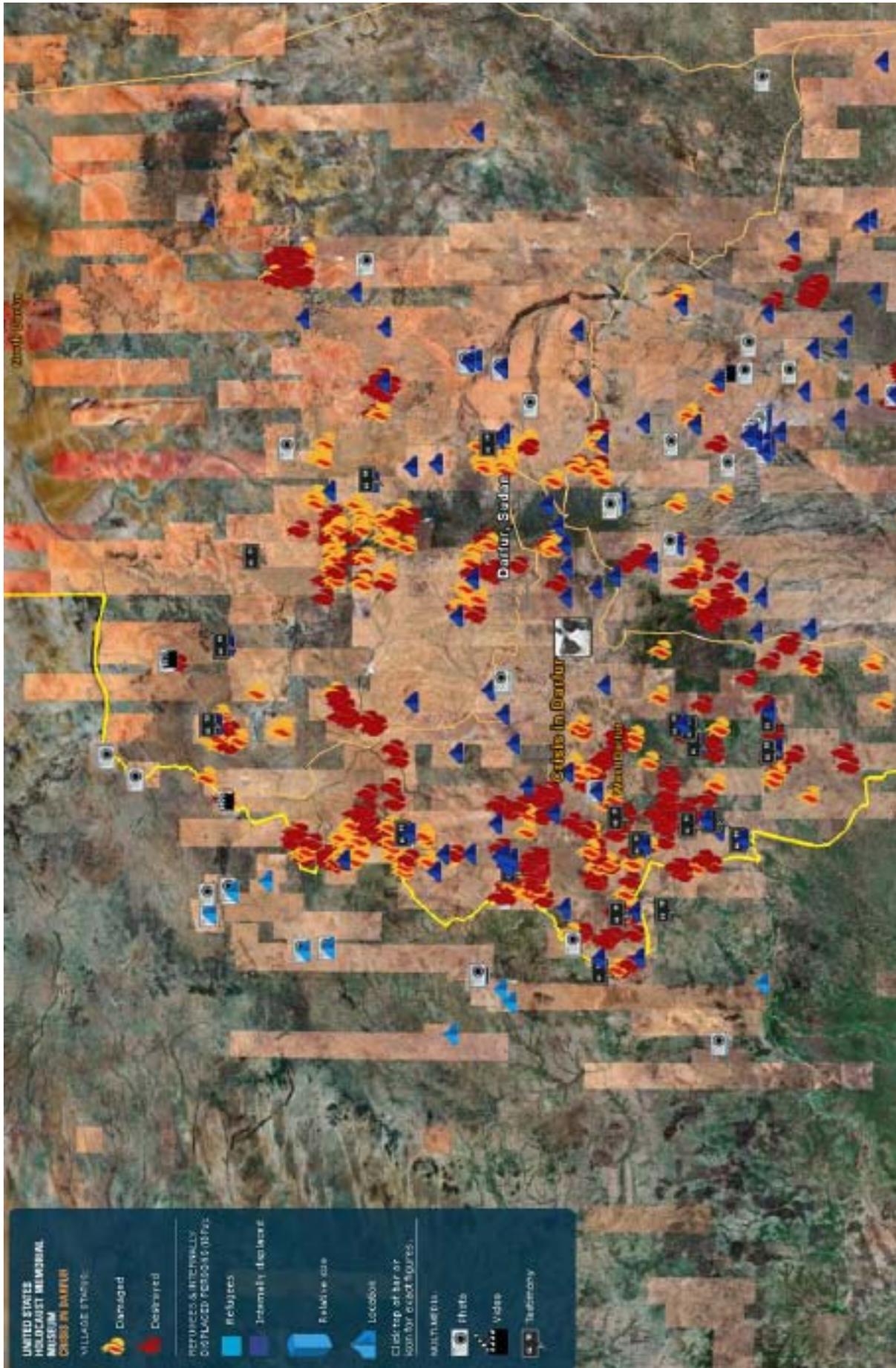
During the First World War, the British became concerned that the sultanate might fall under the influence of the Ottoman Empire. The British then invaded and incorporated Darfur into Sudan in 1916. Under colonial rule, financial and administrative resources were directed to the tribes of Central Sudan near Khartoum to the outlying regions such as the Darfur states.

Sudan gained national independence in 1956. Since Sudan gained its independence there has been political instability caused by the proxy wars between Sudan, Libya and Chad. The influence of an ideology of Arab supremacy supported by Libyan leader Muammar al-Gaddafi that began to be acted upon by Darfurians, including those identified as "Arab" and "African". A famine in the mid-1980s disrupted many societal structures and led to the first significant fighting amongst Darfurians. A low level conflict continued for the next 15 years, with the government coopting and arming "Arab" militias against its enemies. The fighting reached a peak in 2003 with the beginning of the Darfur conflict, in which the resistance of the forces formed the Sudan Peoples Liberation Army into a cohesive rebel movement. The conflict soon came to be regarded as one of the worst humanitarian disasters in the world. Over 2.5 million people have been displaced, many into camps where emergency aid has created conditions that, although extremely basic, are better than in the villages, where there are over 3.5 million people.



A child's drawing of the Jawweed attacking people on horseback.

Site Selection



Google Earth map showing damage (orange) and destroyed (red) villages and IDP camps (light blue) and refugee camps (dark blue).

33 Million Earth upheld 62



62 Bir Kedouas, Chad

64 Angabo, Darfur

66 Camp Examples

Site Selection

Bir Kedouas, Chad

The article below is an account on just one of the many horrific attacks by the Janjaweed in the village of Bir Kedouas in Chad.

Janjaweed attacks on villages in Chad, mirror those in Darfur with unjustified attack on men, women, and children. On December 16, 2005 300 Janjaweed wearing government issued military uniforms attacked the village of Bir Kedouas. The attackers are reported as shouting: "We have come to kill the black slaves" as reported by an elderly man from the village.

The attackers, who rode camels and horses, moved steadily southwards in the course of a 48-hour rampage. They first attacked the village of Nahkulota, where they reportedly killed six people before moving on to Bir Kedouas. Some encircled the village while others rounded up cattle in the cattle camps. Local people told Amnesty International in June 2006 that they had escaped with only the clothes on our backs.

The following day, the Janjaweed attacked three villages south of Bir Kedouas - Birkenji, Sissi and Kateliti. Forewarned of the killing in Bir Kedouas, the inhabitants fled as the Janjawid advanced and escaped without casualties.

Villagers who fled Bir Kedouas told Amnesty the Janjaweed did not attack either the nomadic, cattle-herding Arab Baggara or the Mimi, ethnic Africans who live among the groups targeted for attack in Chad but who have taken up arms alongside Sudanese Janjawid and their Chadian Arab allies. The villagers accused Baggara and Mimi living on the Chadian side of the border of helping the Janjawid by providing information about the location of livestock and the best times and routes to use to attack.

The Sudanese government has taken no action to stop the attacks or to control and disarm the Janjaweed, despite the commitments it has made to do so. For its part, the government of Chad has preferred to deploy its troops to defend against the armed opposition groups within Chad to protect the civilian population from Janjaweed attacks.

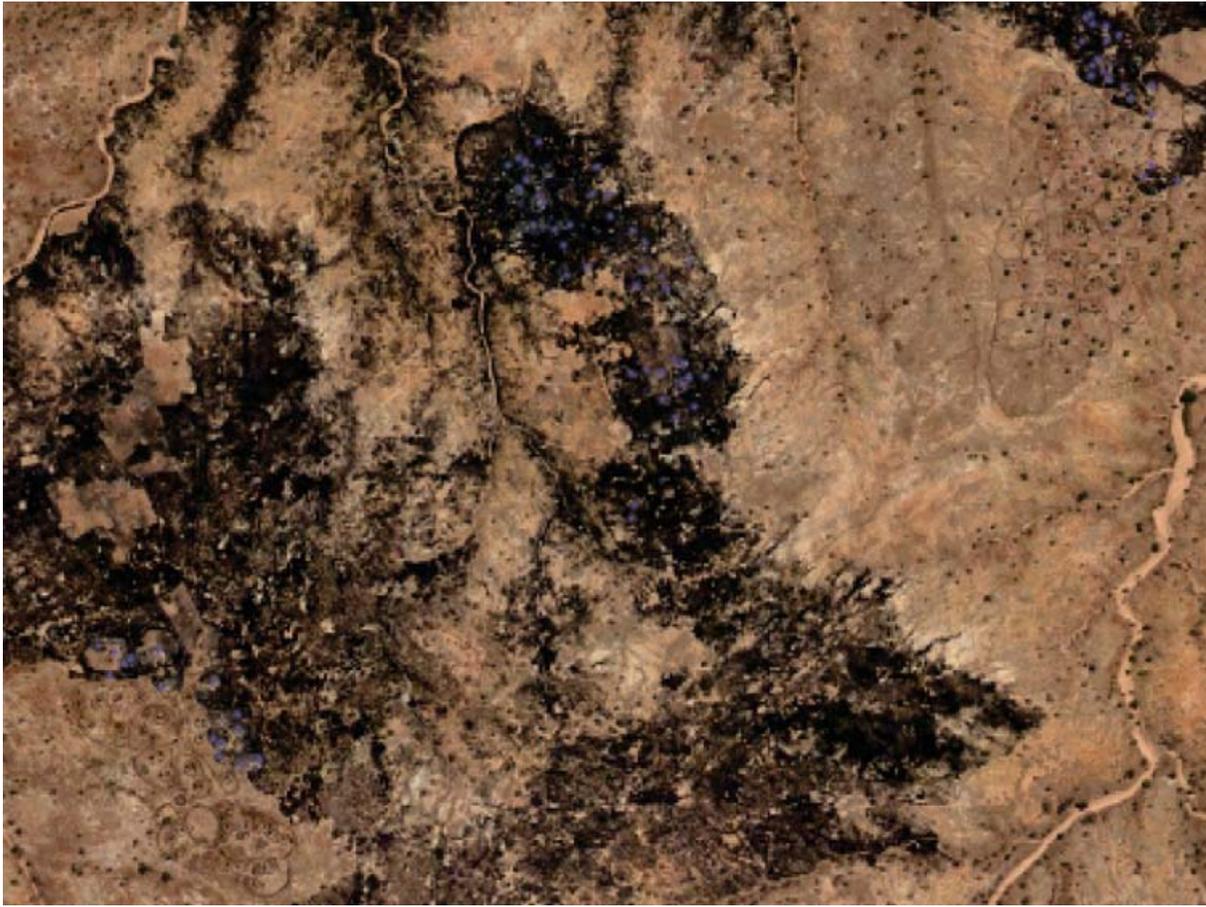


Bir Kedouas villages in Chad before the Janjaweed attacks.



Bir Kedouas villages in Chad after the Janjaweed attacks, with 89 structures destroyed.

Site Selection



The blue marks represent the destroyed and damaged structures and the red marks represents the untouched structures in the Bir Kedouas village.



The blue marks represent the destroyed and damaged structures and the red marks represents the untouched structures in the Bir Kedouas village.

33 Million Earth upheld 66

Angabo, Darfur

The article below is an account on just one of the many horrific attacks by the Janjaweed in the village of Angabo in Darfur.

In the second week of November 2006, relief workers found a badly wounded man lying under trees north of the village of Angabo in South Darfur. The man, an unarmed and elderly civilian, had been shot in the leg and had a fractured femur. He described how armed men had attacked him in his hut in Angabo: "Ten people came inside. They asked me who I was and if I had a weapon. Then they shot me, took all of my money and burned my house. I was still inside when they set fire to it."

The attack on Angabo was one of a series of attacks on a cluster of villages approximately 30 miles north-west of the government-controlled town of El Deain. Some 20,000 civilians - including the entire population of Angabo - were displaced after being "directly targeted" by the militia, according to UN sources in South Darfur who said there was no significant rebel presence in the area at the time. The displaced fled in three directions - north-east toward Um Sauna, north-west toward Sinnat, and southeast toward El Neem camp for the displaced in El Daein.

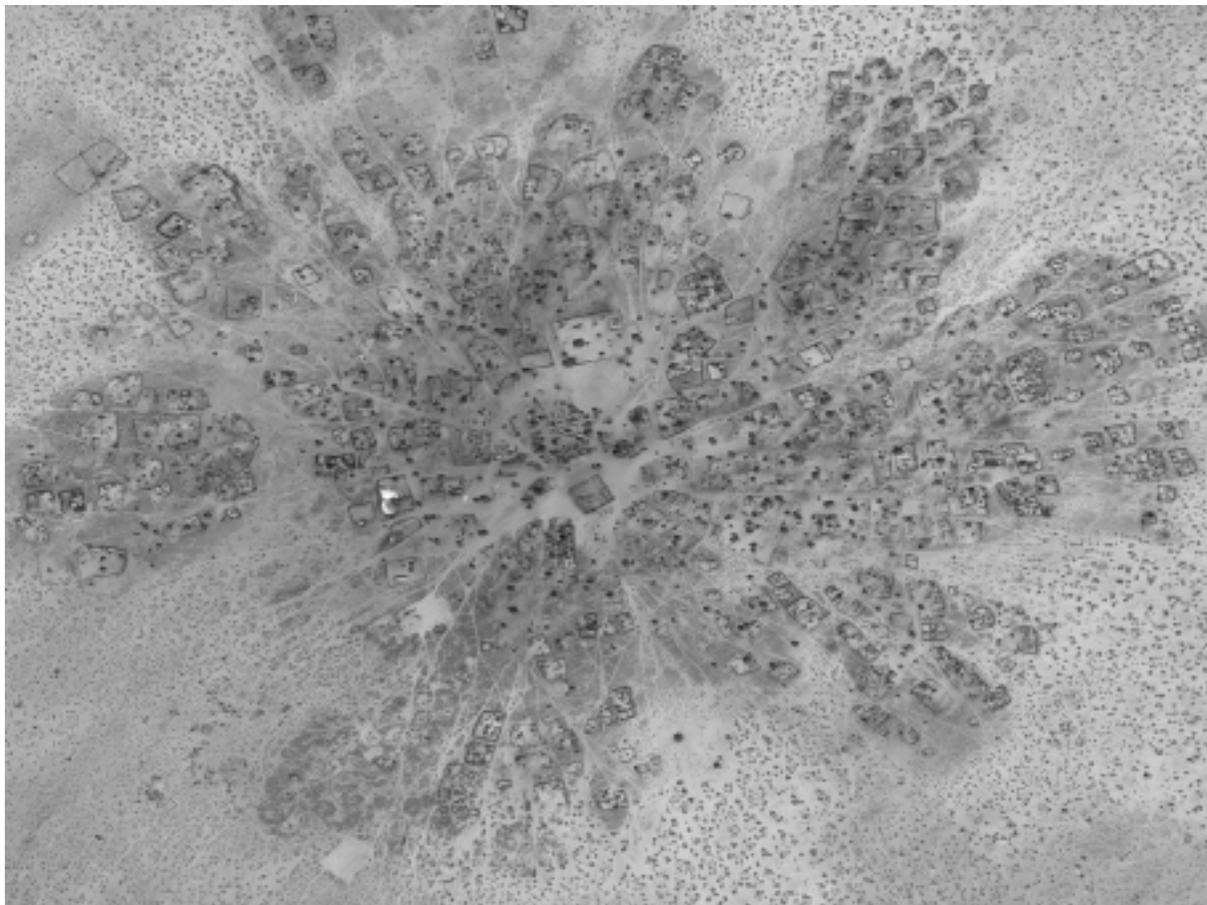
The rebel Sudan Liberation Army and the smaller rebel group, the Justice and Equality Movement, began attacking government targets in Darfur in 2003 to protest what they regard as chronic marginalization and neglect. The government responded by mobilizing its proxy militias, the Janjaweed, and launching a brutal counter-insurgency campaign that targeted civilians from the tribes that formed the backbone of the armed opposition groups - primarily the Zaghawa, Masalit and Fur.

The attacks on Angabo followed a good rainy season which promised a large harvest. But the displaced were too afraid to return to their homes, and crops not harvested spoiled in the fields because of continuing insecurity. With water already becoming scarce, the displaced were forced to drink from pools shared with cattle.

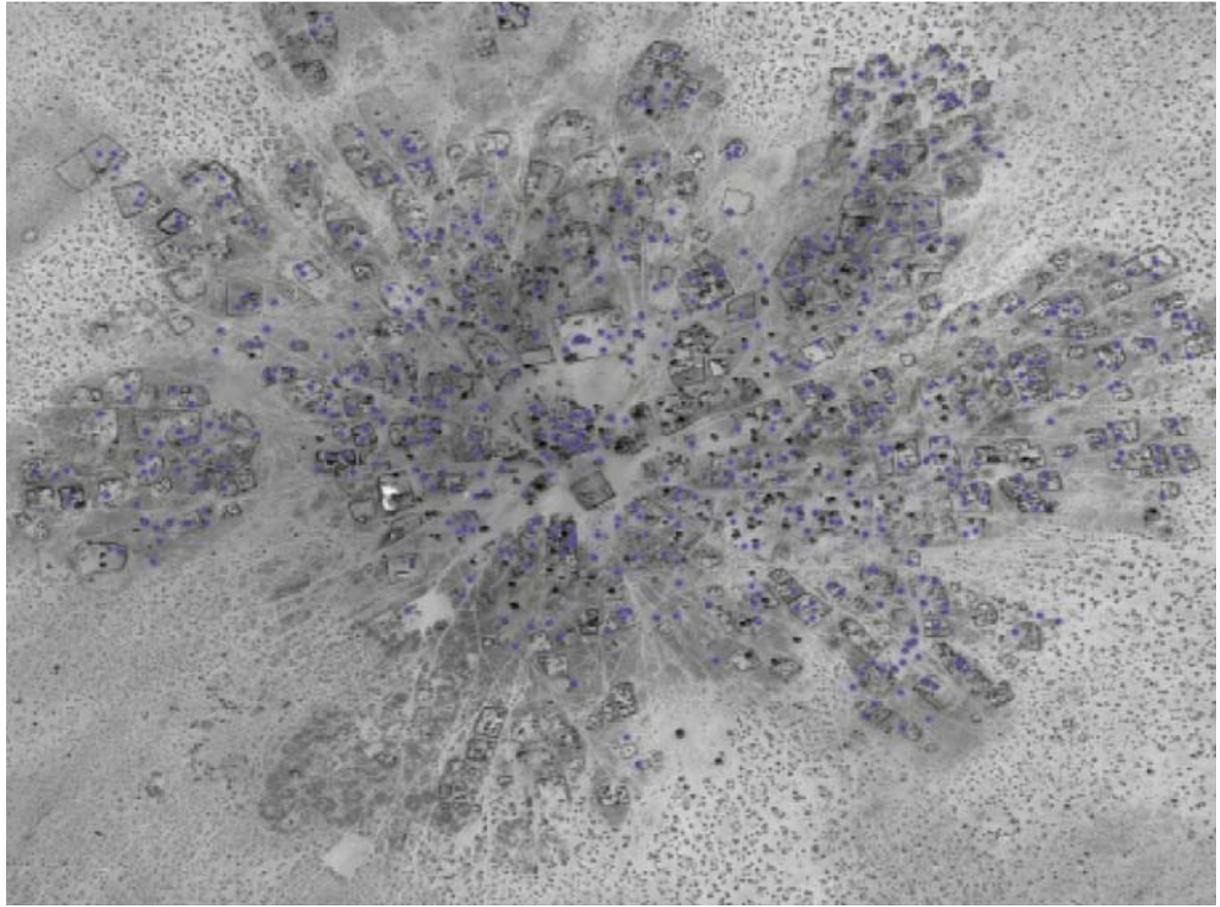
Site Selection



Anagabo village in Darfur before the Janjaweed attacks.



Anagabo village in Darfur after the Janjaweed attacks, with 390 structures destroyed.



The blue marks represent the destroyed and damaged structures in the Angabo village, the village was completely destroyed.



The blue marks represent the destroyed and damaged structures in the Angabo village, the village was completely destroyed.

Site Selection



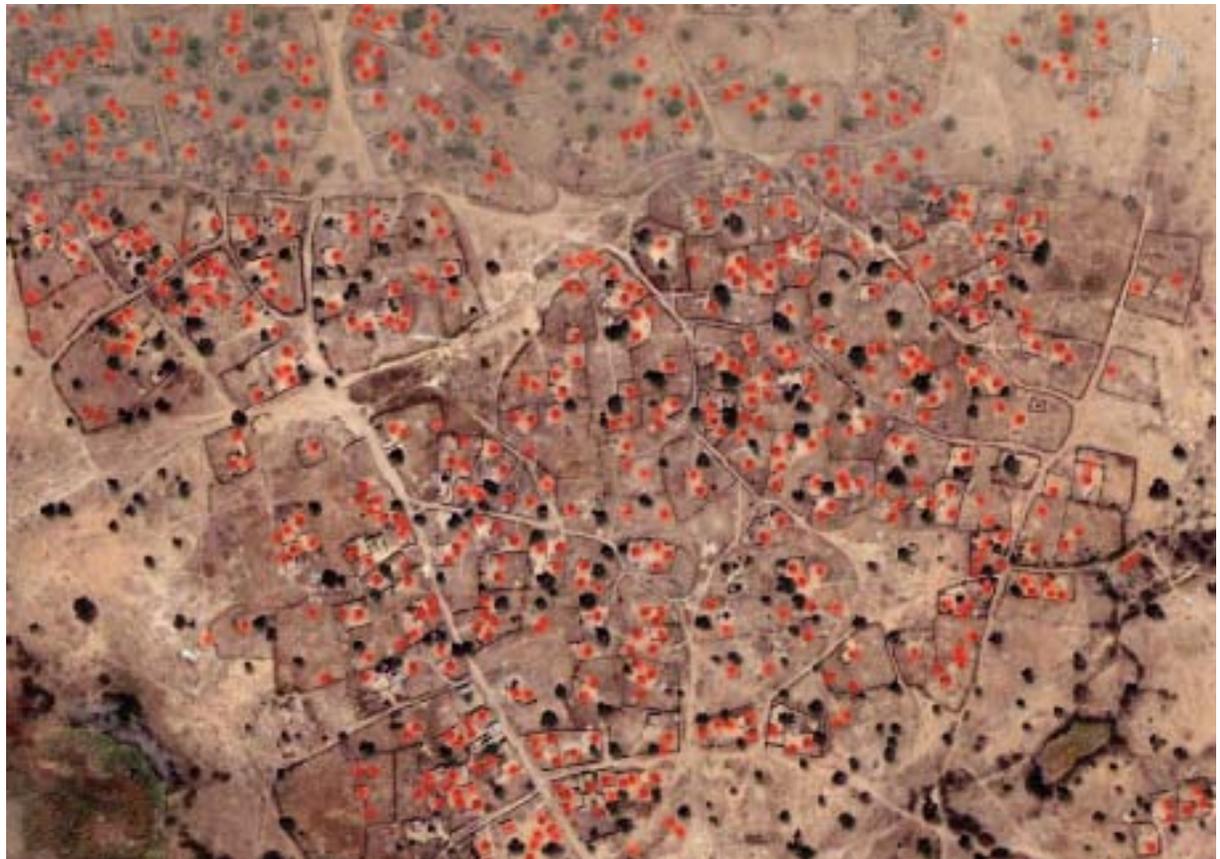
Goz Amer refugee camp in Chad is home to more than 18,200 people.



Kango Haraza IDP camp in Darfur is home to more than 3,300 people.

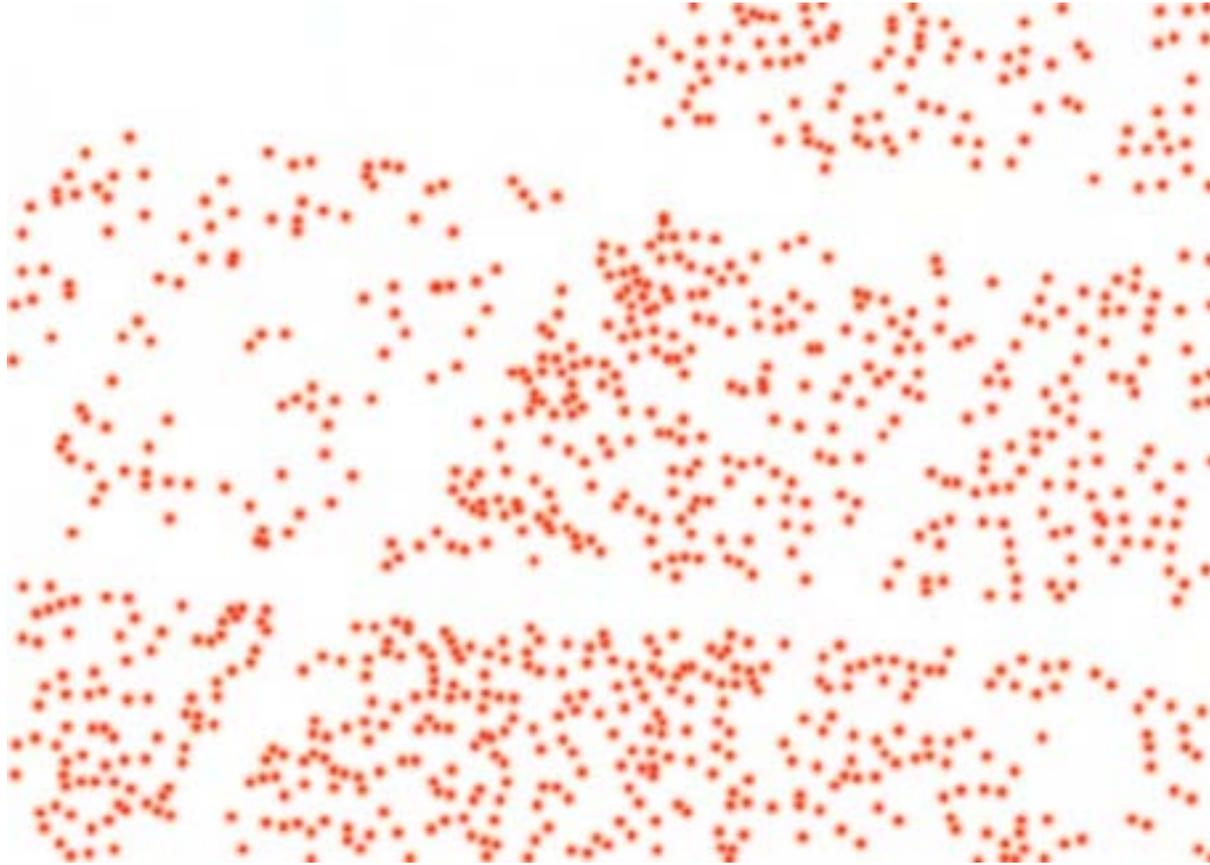


The structures in the Goz Amer refugee camp in Chad are highlighted in red.

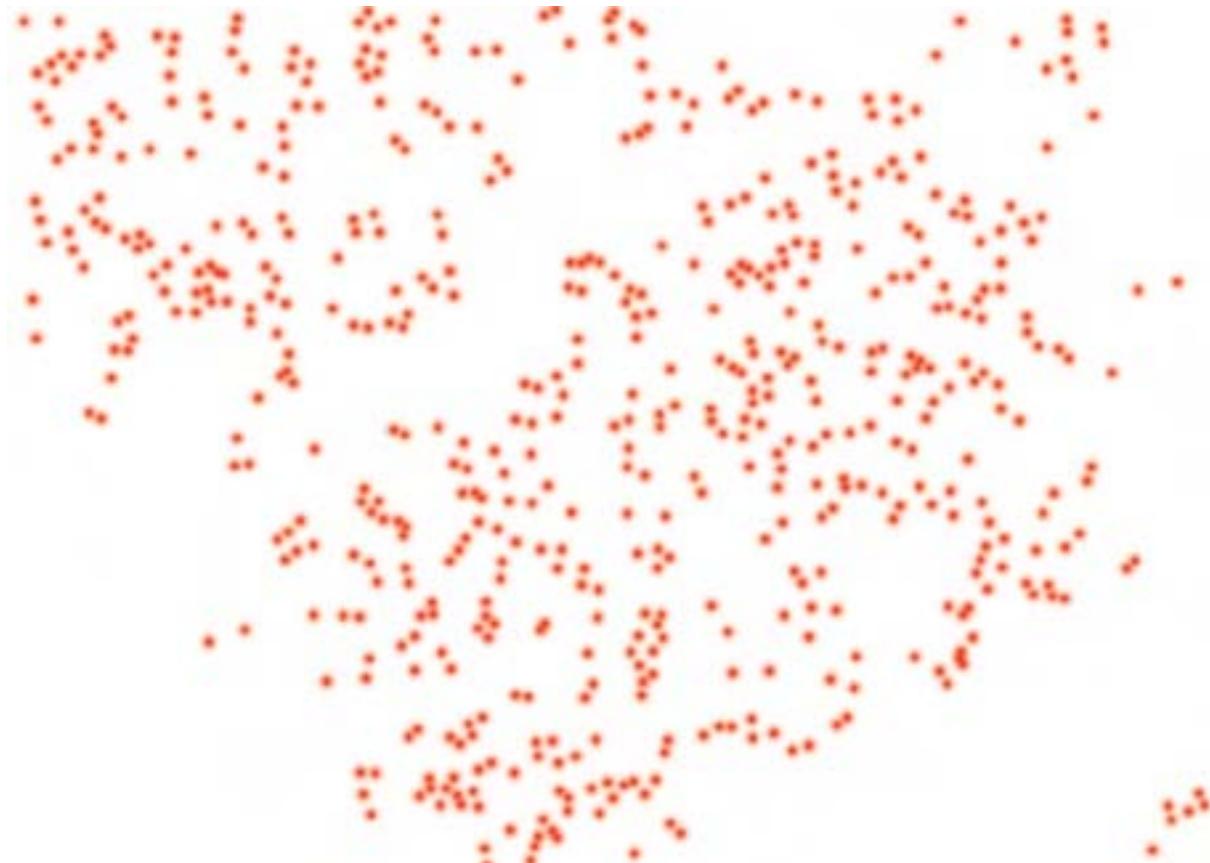


The structures in Kango Haraza IDP camp in Darfur are highlighted in red.

Site Selection



The structures highlighted in red shows a pattern that reveals the patterns of the streets and in the camp.



The structures highlighted in red reveal that there is no pattern to the layout of the camp.

Site Analysis

Camp Location

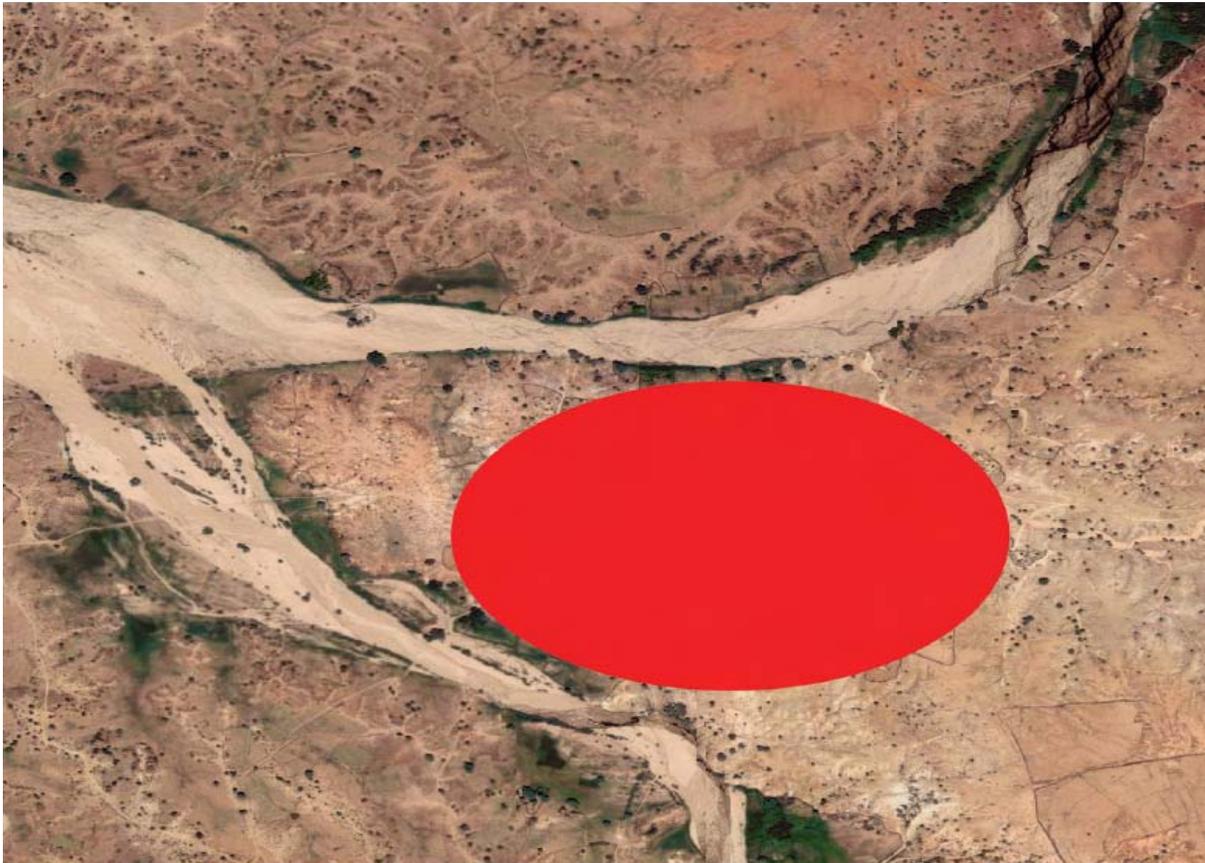


The location of the camp would be in the heart of Africa in Sudan in the unity state along the White Nile. The camp is located in a safe zone over 600 miles away from the conflict area states of Darfur. This location is to show that a camp can exist and thrive even with countries that are under the most distress.

Site Analysis



The camp is located on a natural border between regions that border Darfur.



The river acts as a natural buffer between regions to create a central area for the camp location.

Site Analysis



The final decision on the location of the camp was based on analyzing the specifics of the area. The river is used as a natural buffer for the heart of the camp from the regions that are experiencing the most distress. Along with the river as a buffer it also separates the camp from the directions that the refugees are fleeing from. This setup provides an area for the central location of the camp and where the entrances into the camp will be located. Based on camp research the entrances and main area of the camp need to be separated out of the main area of the camp only security reasons and for incoming refugees to registered and be cared for before entering. The entrances also served as an area for the aid workers for the camp to live and work. Based on the direction of the major and minor incoming of refugees the best location for an entrances came be determined. Also the direction of the nearest city help to determine the layout of the camp with major and minor roads and pathways for circulation of supplies.





81 Possible Program

89 Current Camp Program

90 Actual Program

Possible Program

- Housing
- Health-care
- Education
- Sanitation
- Security
- Agriculture



Possible Program

Housing

- Transportable
 - Semi-perminate
 - Movable
- Durability
 - Climate conditions
- Materials
 - Accessible
 - Natural



Example of a cardboard transportable shelter.



Example of current interior of housing in Darfur.



Example of refugee housing from Doctors Without Borders exhibition in Chicago.

Possible Program

Health-care

- Facilities
 - Clinics
 - Mobile
 - Accessibility
- Supplies
- Food storage and preparation
- Clean drinking water



Supplies to refugee camps in often dropped by planes when aid cannot get to them on the ground.



Example of how to purify water in refugee camps from Doctors Without Borders exhibition in Chicago.

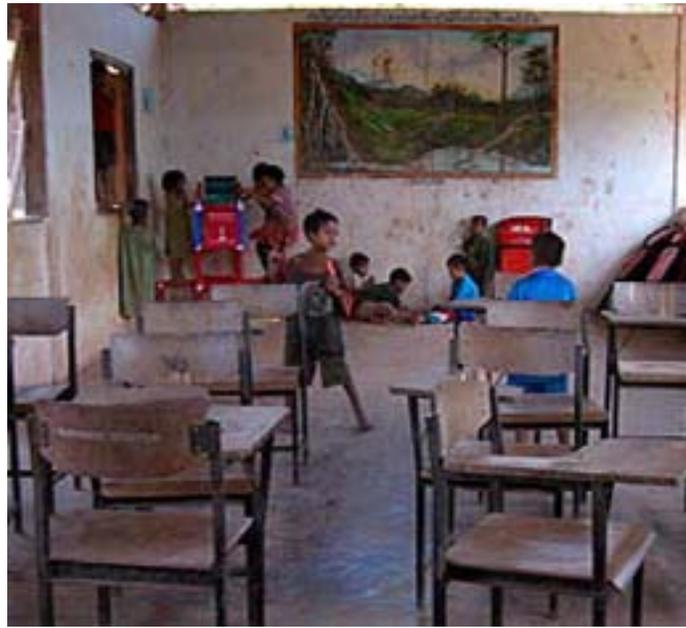


Example of food storage and distribution in the camps from Doctors Without Borders exhibition in Chicago.

Possible Program



Simple picture or work instructions on how to use things within the camps.



People need places to educate themselves not just the children.

Education

- Facilities
 - Mobile
- Durability
 - Climate conditions
- Materials
- How to use
 - Housing
 - Latrines
 - Water supply



An outdoor school created by the people in a camp in Chad.



Some schools are lucky to have four walls and a dirt floor with no roof.

Sanitation

- Latrines
 - Control of human waste
 - Movable
- Durability
 - Climate conditions
- Clean drinking water
- Materials
 - Accessible
 - Natural



Teach people about the cause and spread of diseases and how to prepare and serve food.



Durable and safe structures for the dealing of human waste and spread of disease.

Possible Program

Security

- Protection
 - Housing
 - Water supply
 - Collection of food and fuel
 - Other facilities



Protection of people from attacks by the Sudanese government and the Janjaweed.



Protection of people collecting water and firewood and protection of the wells from poisoning.



Security within the camps to not only there to protect the people but the facilities as well.

Possible Program

Agriculture

- Food
 - Rice
- Building supplies
 - Bamboo
 - Grasses for weaving
 - Rice stalks
- Fuel for cooking
 - Bamboo
 - Rice stalks



Being able to grow materials to implement different techniques from other cultures such as knot makings.



Being able to grow their own building materials such as bamboo.



Giving the people the ability to grow their own source of food such as rice.

UN Regulations

Infrastructure for Refugee Camps

- 1 Latrine per family (6 - 10 persons)
- 1 Well per community (80 - 100 persons)
- 1 Clinic per camp (20,000 persons)
- 1 Hospital per camp (upto 200,000 persons)
- 1 School per sector (5,000 persons)
- 1 Market per camp (20,000 persons)
- 4 Distribution areas per camp (20,000 persons)
- 2 Reuses drums per community (80 - 100 persons)

Site Planning for Refugee Camps

- 30 - 45 square meters of land per person
- 3.5 square meters of shelter per person
- 20% - 25% of entire site should be roads and walkways
- 15% - 20% of entire site should be open public space
- 1 x 100 liter reuse bin per 50 people
- 15 - 20 liters of water per person per day
- Warehouse space for food (1.2 square meters per ton)

Actual Program

Camp Design Regulations

Camp Population

- 20,000 people per camp
- 5,000 people per sector
- 80 - 100 people per community
- 6 - 10 people per family

Needed Camp Infrastructure

- Entrance
 - Reception area
 - Clinic
 - Food storage
 - Administration facilities
 - Aid worker facilities
- Gates and security
 - Vehicle entrance
- Housing
- Latrines
- Hospital
- Clinics
- Schools
- Water source area
- Food distribution area
- Market areas
- Community areas
 - Soccer Fields
 - Meeting facilities
 - Gathering spaces
- Quarantine area
- Cemetery
- Agricultural areas

Number of Camp Infrastructure

- 2,000 - 3,500 houses
- 2,000 - 3,500 latrines
 - 1 latrine per family
- 1 hospital per camp
- 16 clinics
 - 2 clinics per sector
- 26 schools
- 7 markets
 - 2 camp markets
 - 1 sector market
- 400 reuse bins
 - 2 reuse bins per community
- 22 wells or water collection
 - 2 wells minimum per sector

Focused Camp Infrastructure

- Housing
 - Group Family Housing
 - Single Family Housing
 - Children Housing
- Clinics
- Schools

Site Planning

- Total land area 141,477 square miles
- 1,260,000 square feet of housing shelter per camp
- 63 - 105 square feet per family of shelter
- 10.5 square feet per person of shelter
- 45,000 square feet for hospital area
- 17,000 square feet per clinic area
- 125,000 square feet of total school area
- 800,000 square feet of agriculture land
- 66,000 square feet per quarantine area
- 20% - 25% of entire site should be roads and walkways
 - 35,000 square miles
- 15% - 20% of entire site should be open public space
 - 28,000 square miles

Additional Research





97 Questions

102 Camp Facts

105 Shelters

167 Materials

What is a refugee?

Someone who has been forced to leave their home for reasons such as religious or political persecution, war or natural disaster. People who have crossed an international border and are protected and assisted by the United Nations High Commissioner of Refugees (UNHCR).

What is an Internally Displaced Person (IDP)?

IDP's are often displaced for the same reasons as refugees, but they have not crossed an international border and remain in their country of origin. Due to international law IDP's are not protected under international law and the response to their need differs significantly from that of refugees by the UNHCR.



Two young Iraqi children role playing with hand guns.

Questions

What happens to refugees as they flee persecution?

Many refugees are forced to leave their homes without warning and cannot often bring basic necessities with them. When these individuals flee, they try to get to a country they are allowed to migrate as a refugee. For every person who gets to a refugee camp, there is one who does not. Once the each individual reaches the refugee camp, they are often placed in an overcrowded and under-supplied camp. Here the people are also exposed to disease, crime, and other harsh conditions. The each individual refugee usually stays in the camp until the United States or another country accepts their application for residency. The wait for acceptance ranges from one month to eight years or more. Less than fifty percent of those who apply for refugee status are actually approved to come to the United States.

What is a refugee or IDP camp?

A refugee camp is a temporary camp built up by governments, the United Nations, international organizations, such as the International Committee of the Red Cross or Non-Governmental Organization to receive refugees. Hundreds of thousands of people may live in a camp at any given time.

Since refugee camps are generally set up in an impromptu fashion and designed to meet basic human needs for only a short time a humanitarian crisis can result. Most Refugee camps can be quite dirty and unhygienic. Some refugee camps, such as Ein el-Helweh have continued in a temporary manner, for decades, which has major implications for human rights.

People may stay in these camps, receiving emergency food and medical aid, until it is safe to return to their homes. In some cases, often after several years, other countries decide it will never be safe to return these people, and they are resettled in "third countries," away from the border they crossed.

How does a refugee become a refugee?

The process for proving "refugee" status is often very difficult. The countries that accept refugees for resettlement examine the lists of individuals and determine if any of these individuals meet their own criteria for resettlement. This process can take a long time.

What are the options for refugees?

Most refugees would prefer to return to their country of origin. They are allowed to return only if conditions stabilize enough so that their safety is guaranteed upon return.

The second option for refugees is to remain in their host country. However, host countries often become overwhelmed by the numbers of refugees arriving and are often unable to permanently support them and therefore, are unable to offer the option of becoming citizens.

The last option is for refugees to resettle in a third country, usually the U.S. or in Western Europe. This is the least preferable option as far as the welfare of these individuals is concerned because it brings refugees into a different environment far away from their homelands.

Who decides who is a refugee?

Governments establish status determination procedures to decide a person's legal standing and rights in accordance with their own legal systems. UNHCR may offer advice as part of its mandate to promote refugee law, protect refugees and supervise the implementation of the 1951 Refugee Convention.



A young refugee girl in Chad.

Questions

Who helps the internally displaced persons?

Internally displaced people (IDPs) flee their homes for the same reasons as refugees, but remain within their own country and are thus subject to the governing laws. Though it does not have a specific mandate in this field, UNHCR has been assisting several million of the estimated 23.7 million global population of IDPs for many years

Can a soldier be a refugee?

A refugee is a civilian. A person who continues to be apart of armed militia against their country of origin from the country of asylum cannot be considered a refugee.

Can a woman who fears that she, or her daughter, will be genitally mutilated claim refugee status?

In several countries including France, the Netherlands, Canada, the United Kingdom and the United States, it has been officially recognized that genital mutilation represents a form of persecution and that it can be a basis for refugee status.

Is a person who fears persecution because of sexual orientation eligible for refugee status?

Homosexuals may be eligible for refugee status on the basis of persecution because of their membership of a particular social group. It is the policy of UNHCR that people facing attack, inhumane treatment, or serious discrimination because of their homosexuality, and whose governments are unable or unwilling to protect them, should be recognized as refugees.

What is temporary protection?

Nations at times offer “temporary protection” when they face a sudden mass influx of people when their regular asylum systems would be overwhelmed. In such circumstances people can be speedily admitted to safe countries, but without any guarantee of permanent asylum.

“Temporary protection” can work to the advantage of both governments and asylum seekers in specific circumstances. It does not substitute for, the wider protection measures, such as formal refugee status.

Temporary protection should not be prolonged, and after a reasonable period of time UNHCR advocates that people benefiting from this should be given the right to claim full refugee status. Those rejected should be allowed to remain in a country of asylum until it is safe to return.

Must every refugee undergo individual status determination?

People who apply for refugee status normally need to establish individually that their fear of persecution is well-founded. However, during mass exoduses individual screening may be impossible. In such circumstances, particularly when civilians are fleeing for similar reasons, it may be appropriate to declare “group” determination of refugee status. This is where each person in the group is considered as a refugee in the absence of evidence to the contrary.



A Doctors Without Borders volunteer helps a small boy with an injury.

Camp Facts

Governments normally guarantee the basic human rights and physical security of their citizens. But when civilians become refugees this safety net disappears. UNHCR's main role in pursuing international protection is to ensure that states act on their obligations to protect refugees and people seeking asylum. Countries may not forcibly return refugees to a territory where they face danger, nor discriminate between groups of refugees.

A refugee has the right to safe asylum. However, international protection consists of more than physical safety. Refugees should receive at least the same rights and basic help as any other foreigner who is a legal resident. This includes the freedom of thought, of movement and freedom from torture and degrading treatment. Economic and social rights are equally applicable. Refugees should have access to medical care, schooling and the right to work. Refugees are also required to respect the laws and regulations of their host country.



Transportation is mostly by donkey if a family is lucky to have one, most livestock is stolen or killed during attacks.



A small market in a village yet untouched by the "war".

Developing countries with per capita income less than two thousand dollars host more than two-thirds of the world's refugees, while nations with per capita incomes over ten thousand dollars host only four percent.

More than seven million refugees have been "warehoused" for ten years or more in camps, segregated settlements, and otherwise deprived of basic rights.

Some refugees, including more than four hundred thousand Sudanese and two million Afghans, have stayed in camps and other temporary shelters for more than twenty years.

Eighty percent of refugees are women or children. During wartime, men are frequently forced to fight and are often killed in the unrest.



People fleeing from their home country from fear of death.



107 Housing
137 Health-care
155 Education

Housing



Emergency Shelter

Emergency shelters are places for people to live temporarily. An emergency shelter specializes in people fleeing a specific situation. People staying in emergency shelters are more likely to stay all day, except for work, school, and other errands.

Post-disaster emergency shelter is often provided by organizations like the Red Cross and Red Crescent, UNHCR or governmental emergency management departments, in response to the emergency. They tend to use tents or other temporary structures.

Temporary tent cities with shelters may also include mass decontamination facilities to cleanse large numbers of evacuees prior to assigning them to shelters, or to hold people in isolation or quarantine.

Transitional Shelter

Transitional shelter is any range of shelter options that help a person or population displaced by conflict or natural disaster until they return to permanent facility.

Transitional shelter is a strategy which seeks to support communities back to permanent facility, minimizing displacement, and taking into account town planning, sanitation, land use, human rights, neighboring populations, the local economy, security, and cultural factors. Refugee camps are considered as one of a range of options, including use of host families, self settlement, and cash donations for building materials.

A transitional shelter is a structure in which usually a family can live for as long as their permanent facility takes to build or restore. Ideally it will be built from local materials according to local methods, and be adaptable to climate and culture, and it can be disassembled and the materials reused or resold.

Housing

Emergency Shelter Systems

Bough Shelter:

To construct a bough shelter you must first look for branches that are low to the ground or fallen trees that offer protection from the wind. Then secure branches by lashing. Finally weave in other branches to add additional protection from the elements.

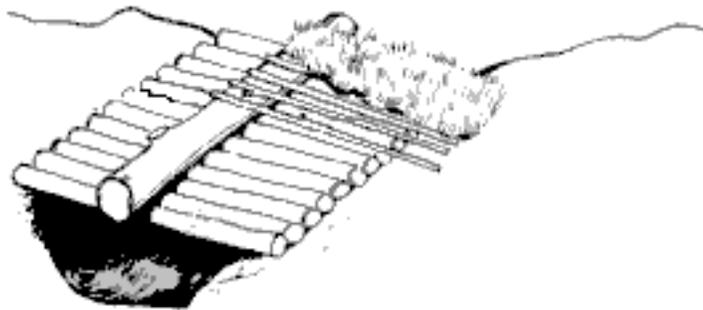


Root Shelter:

To construct a root shelter look for spreading roots and compacted earth at the base of a fallen tree that can be used as protection. Then fill in the sides around the roots to provide a solid base for construction of something more elaborate.

Natural Hollow:

To construct a hollow shelter look for an area with a shallow depression in the earth will provide some protection from wind. Then lay a few light branches across the hollow and then a larger branches across them, as pictured below. This will give pitch to shorter branches that are to be laid across the top to keep rain out. To finish the roof add turf and leaves.



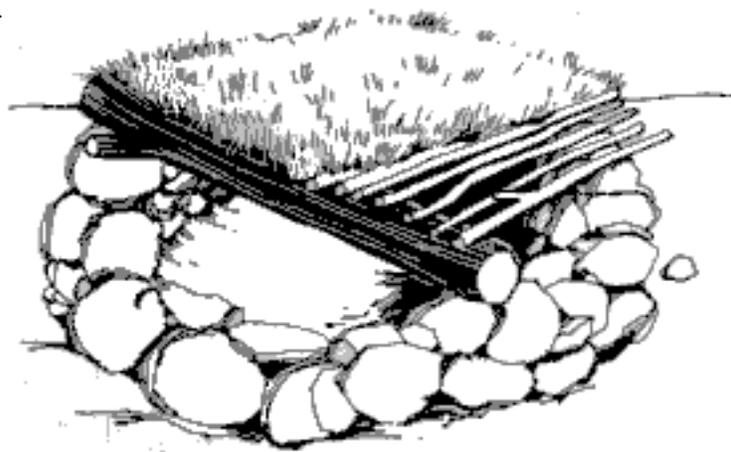
Fallen Trunk:

To construct a fallen trunk shelter look for a fallen trunk which alone provides protection from the wind. Then scoop out a small hollow on the leeward side and construct a lean-to roof of boughs.



Stone Barriers:

A stone barrier shelter is constructed to provide more head room. A low wall of stones should be built up around a hollow or shallow depression. The walls should be filled in with mud, leaves, twigs or turf. The roof is constructed of branches and turf.



Sapling Shelter:

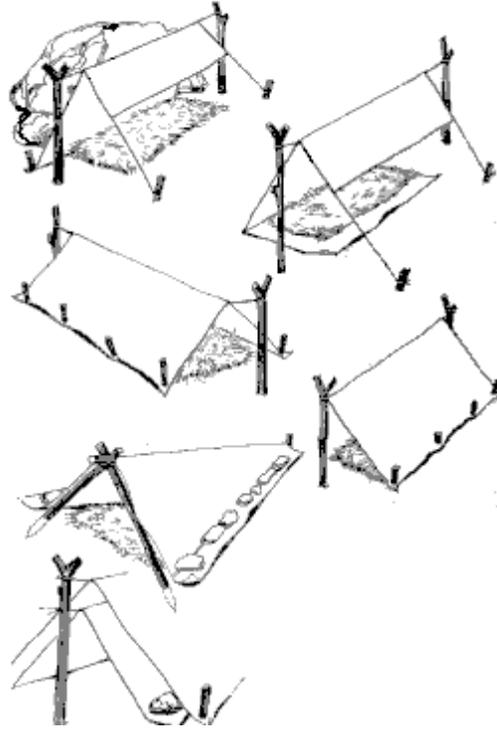
To construct a sapling shelter first clear the ground in a growth of saplings. Then tie the tops of them together. Branches then should be weaved between the saplings and cover with ferns or turf. If there is access to a waterproof sheeting throw it over the saplings and weigh it down with stones or logs.



Housing

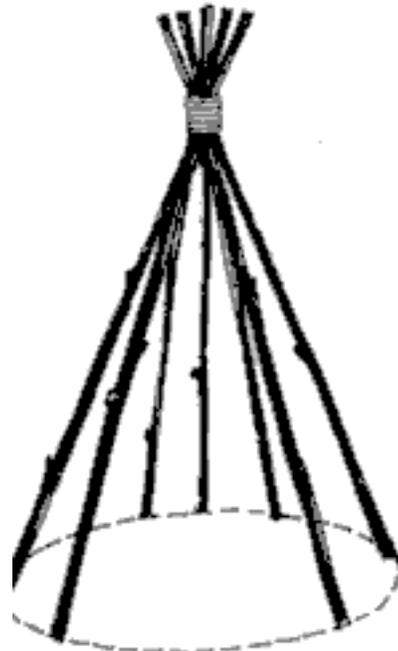
Bashas:

To construct a bashas shelter use a waterproof poncho, groundsheet, piece of tarpaulin, or plastic sheeting. Then a structure can be formed that is referred to in the military as a basha. There are a few examples show below of possible design.



Tepees:

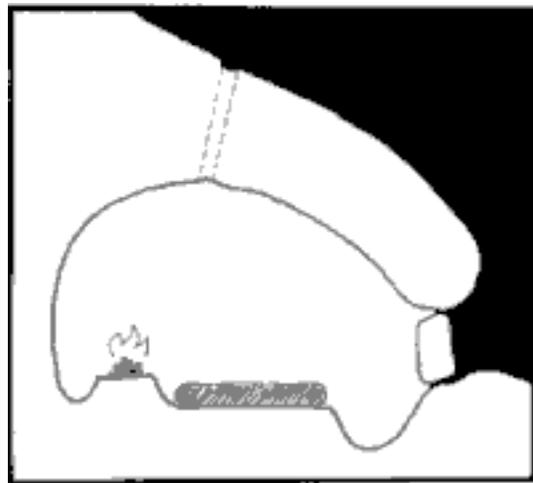
To construct a tepee tie three or more relatively straight branches together, before erecting them, into a cone shape. Then cover the branches with hides, sheeting, or panels of tree bark, but make sure to leave a hole for ventilation.



Advanced Emergency Shelter Systems

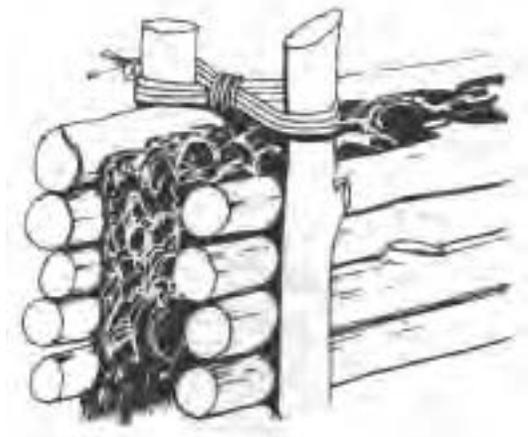
Snow Cave:

To construct a snow cave shelter first dig into a drift of firm snow to make a cave. Make sure to remember that warm air rises and cold air sinks so make the shelter on three levels as shown below. Build a small fire and the highest level, sleep in the middle, and allow the lower level to trap cold air. Use a stick or ice axe to force two holes in the roof, one is to allow smoke to escape and another is for ventilation. Lastly fit a packed block of snow for a door.



Stick Walls and Screens:

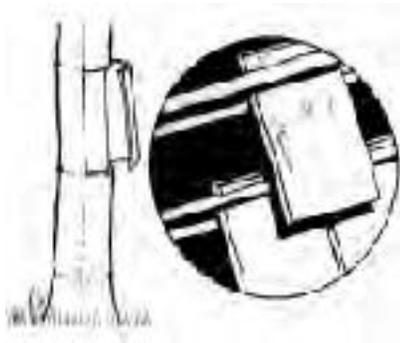
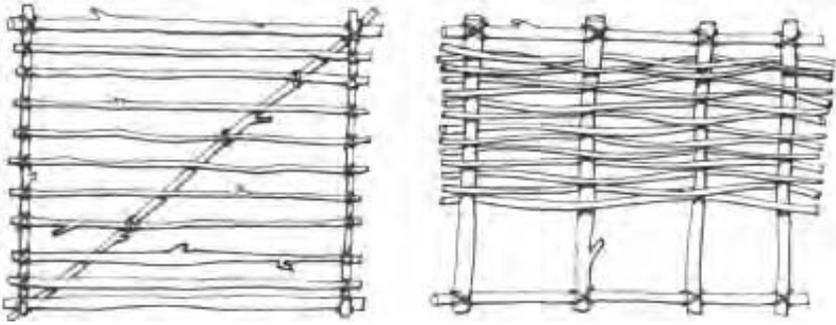
It is possible to build simple walls by piling sticks together between upright branches driven into the ground and tied at the top. The gaps are filled in with dirt to keep the elements out.



Housing

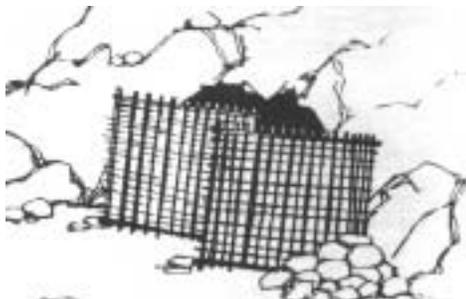
Coverings:

To make coverings for roofs or walls you need saplings, small branches, plant stems, grasses, or long leaves. Then make a frame from a stronger branches. Then tie the branches together and weave in the materials.



Caves:

Caves can provide a ready made shelter. Caves in rock set above valleys are normally dry even with seepage through the roof. Caves can be cold and sometimes homes to the local wildlife. If the cave faces into the wind build up two screens outside the entrance, one on each side overlapping each other, as shown below to provide protection.



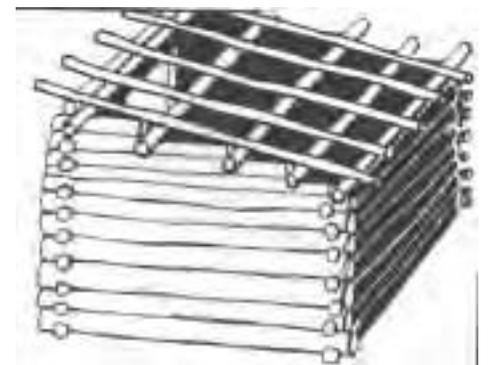
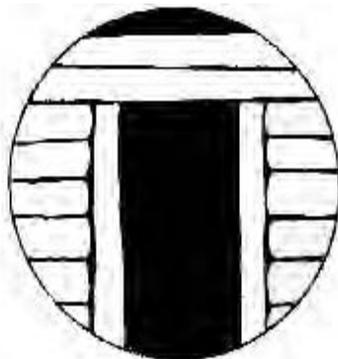
Turf Houses:

Turf houses are useful in areas where timber is scarce or there is not the necessary tools to work with wood. Sections of turf need to be cut into about 18 x 6 inch blocks and stacked in a overlapping configuration. The walls should be sloped towards the rear to give pitch to the roof. A cover should then be made and attached to the roof branches and covered with leaves and a layer of turf. The walls should be built high enough to sit in but not stand, and leave the leeward side open or build in a doorway into the leeward side for a stronger structure. Use a fire outside the door with a fire reflector behind to provide a source of heat if needed.



Log Cabins:

The size of the cabin will depend on two things. One is the size of the timber and the other is the number of people. A square or rectangle shape is the simplest structure to construct. A level site is needed to build on. Logs need to be cut down using an axe or hand saw. The gaps between the logs should be filled in with a mixture of mud and wood chips from the logging. The roof then should be covered with saplings before laying of mud and turf. A fire place if possible should be made of stone with clay used as a filler.



Housing



The hooch dwelling, a single point foundation, pre-fab treehouse.

The Hooch Dwellings

Project lead: N/A

Location: Rincon', Puerto Rico

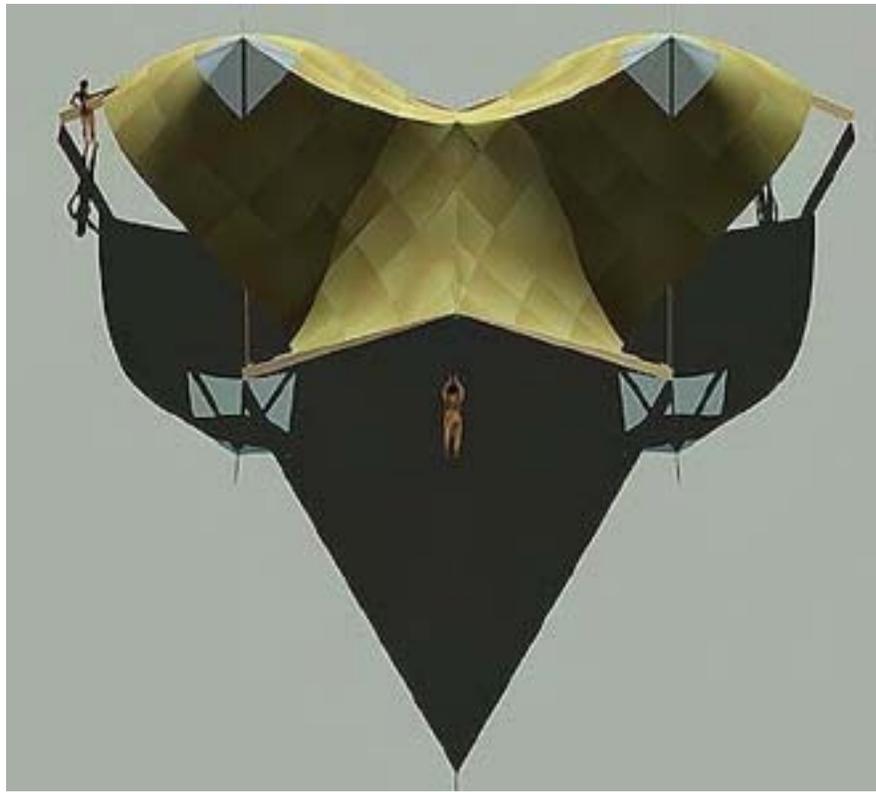
Start Date: June 9, 2005

Size: 100 square feet

Cost: N/A

Project Description:

The dwelling would be a pre-fabricated tree house with a single point foundation. The foundation would not permanent and the tree house is stabilized with cables to surrounding trees. The shelter is temporary but is extremely resilient: earthquake, hurricane, and tsunami resistant. It has natural intrusion resistance and is resistant to ground based wildlife, but is not insect resistant without the use of netting.



Burning Man Conic computer rendering.



Working Toward The Horn.

Conic Shelter

Project Lead: Chuck Henderson

Location: Anchor Bay, California

Start Date: August 21, 2004

Size: 1000 square feet

Cost: \$2000

Project Description:

A temporary shelter constructed in 48 hours by an unskilled crew.

Housing

SHRIMP

Project Lead: Jeffrey Warren

Location: unspecified

Start Date: July 3, 2007

Size: N/A

Cost: N/A

Project Description:

The SHRIMP (Sustainable Housing for Refugees via Mass Production) is an attempt to bring housing and other relief shelters to large displaced or homeless populations. The shelter is to provide for a family of four, it folds up into one-fourth of a shipping container for efficient distribution.



Interior image of a section model of the SHRIMP design.



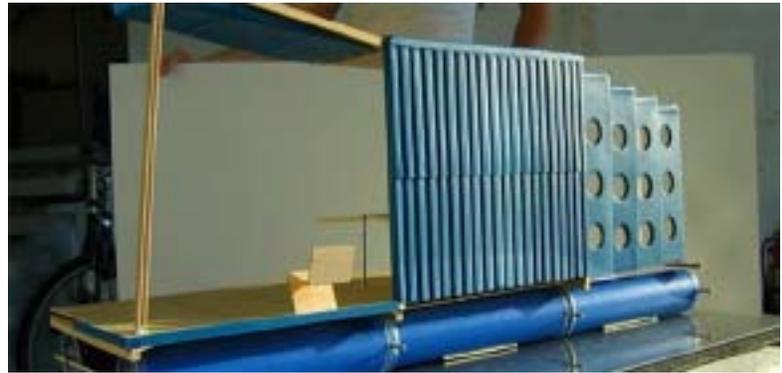
Larger view of the section model for the SHRIMP design.

Project Details:

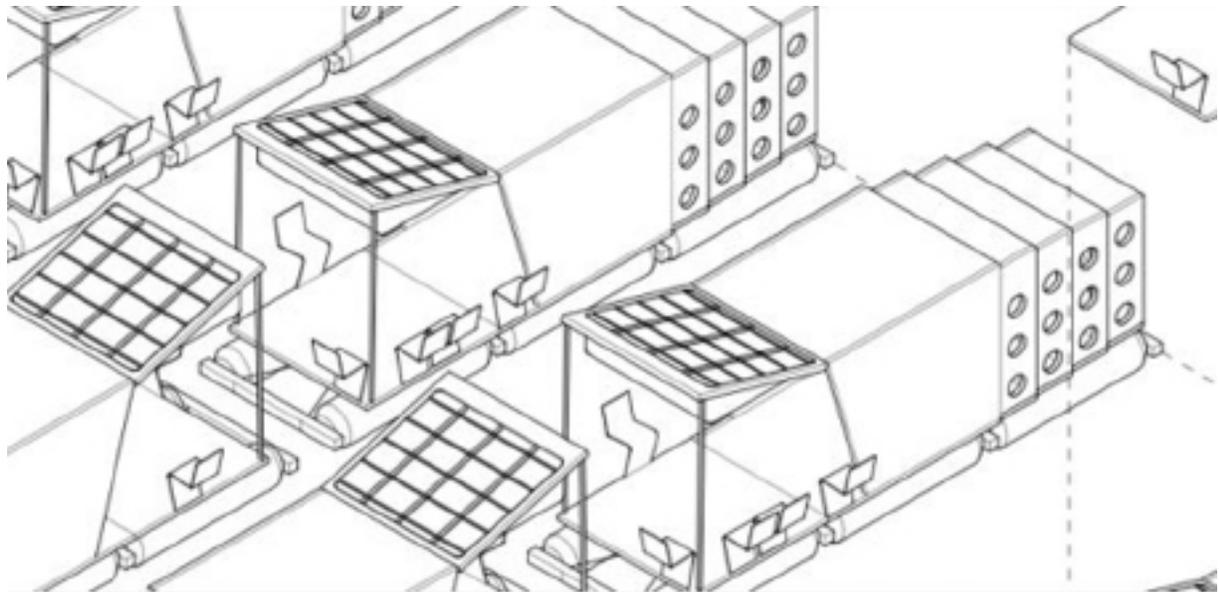
The shelter starts as a 10' x 9.5' x 8' box. Because of the standard size and self-contained design, the SHRIMP can be distributed in large quantities. There is also the use of a solar distillery on the SHRIMP's roof, so that fresh water needs are reduced.

The SHRIMP has pontoons which automatically inflate, using compressed air canisters so that assembly takes only minutes. With this system the units can be unloaded anywhere there's water and because of its standard size it easily fits into shipping containers.

SHRIMP units can be refitted for reuse. They can also be retrofitted out of shipping containers.



Exterior image of the section model of the SHRIMP design.



Drawing of the SHRIMP design.

Housing



Interior surface bi-furcation is in two usable levels, the lower for shedding wet clothes, the upper for living.

Rapidly Deployable Cold Climate Temporary Enclosure

Project Lead: N/A

Location: Unspecified

Start Date: August 19, 2006

Size: N/A

Cost: \$500

Project Description:

This shelter was developed in response to the need for a quick temporary construction for cold climates in areas with few local supplies for building, with limited accessibility, and little to no training or assumed knowledge for construction.



1



4



2



5



3



6

An inner bladder is inflated and the resultant cavity is stiffened from a two part polyurethane foam that is mixed on site and poured into the cavity. Solidification into a space that can be occupied enclosure occurs within one hour. The above series of images is taken from a scaled prototype in development.

Housing



Render of interior of housing design.

Air Envelope

Project Lead: Nakamura & Koike

Location: Kosovo

Start Date: March 18, 2007

Size: N/A

Cost: N/A



Night image of a scale model of housing design.



Rendering of housing design solution.

Project Description:

Architecture for Humanity hosted an open competition to design five-year transitional housing for the returning people of Kosovo. In early 1999, nowhere was the need for shelter more critical than in the war-torn region of Kosovo. Hundreds of thousands were without a place to live. The competition's goal was to foster the development of housing methods that would relieve suffering and speed the transition back to a normal way of life. Architects and designers from thirty different countries responded. AFH received more than two hundred designs. From these, a jury selected ten finalists and twenty notable entries. This proposal from Nakamura and Koike of Tokyo, Japan was one of those ten finalists.



Rendering of the proposed camp layout with housing solution.

Housing

P.L.U.S. System

Project Lead: Design Camp 2003

Location: Minneapolis, Minnesota

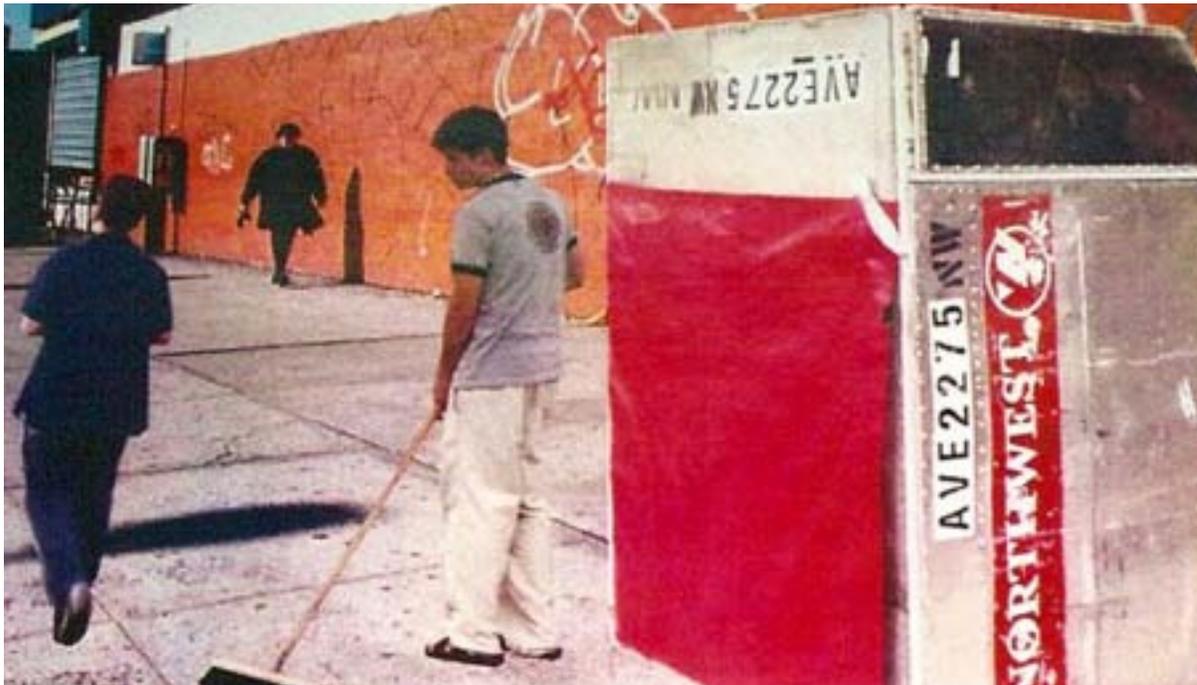
Start Date: June 22, 2003

Size: N/A

Cost: N/A

Project Description:

The design team was given an aircraft cargo container in order to transform it into a transportable, personal living unit. The team was not allowed to cut into the container. The solution that they came up with was to create a cage that would fit inside the container. The cage would then be attached to fabric which would create a hallway when pulled out. The cage would also include a telescoping roof to provide standing space. The idea behind these new living spaces would encourage people to "get out" more often which could potentially alleviate the many, everyday plagues of today's reality.



Rendering of the proposed container shelter.

Do it Yourself!

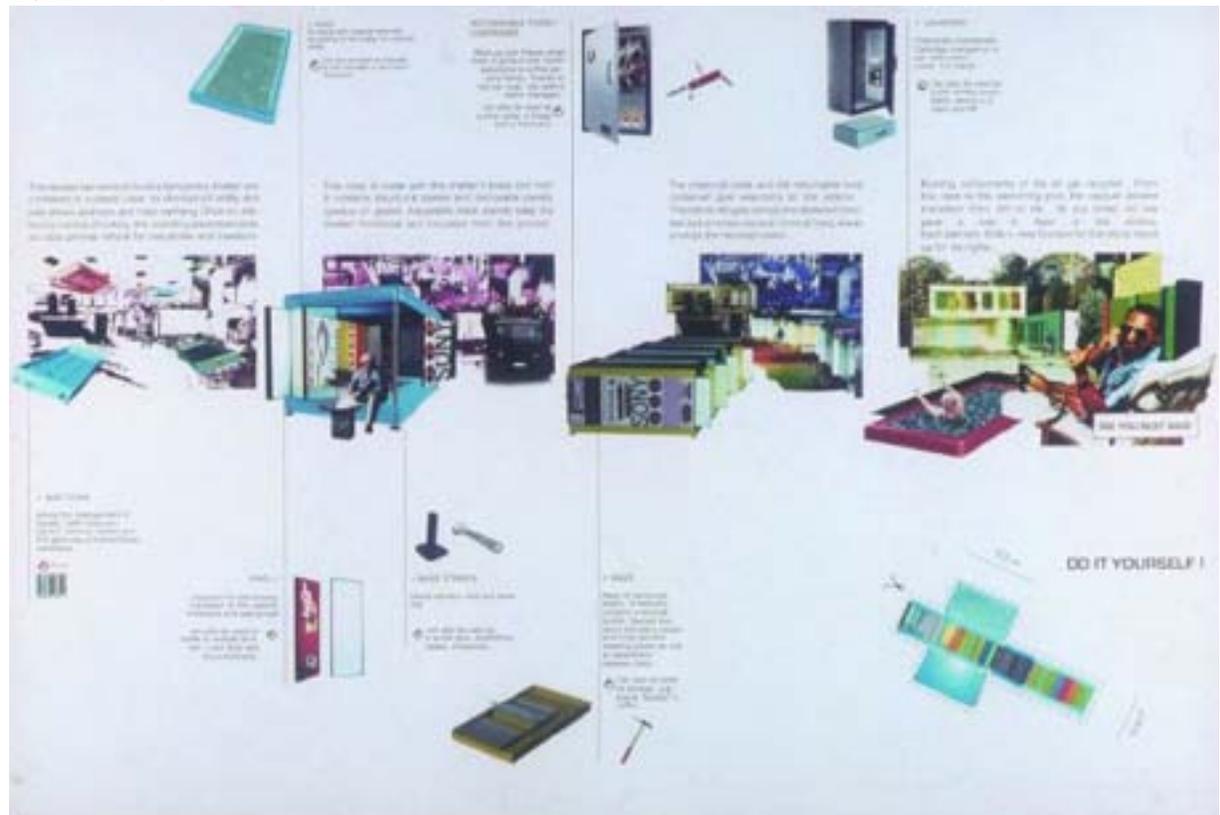
Project Lead: Wonderland Productions

Location: Kosovo

Start Date: March 17, 2007

Size: N/A

Cost: N/A



Transitional Housing entry board.

Project Description:

The materials and systems needed to provide a temporary shelter are contained in a plastic case. The shelter can be air dropped, delivered by truck, or even carrier to areas in need. This case is made with shelter's base and roof. The case also contains structural stakes and removable panels, opaque or glazed. There is also a chemical toilet and the returnable food container to be used by the users of the shelter. Building components of the kit can be recycled.

Housing



Study models and material explorations for the proposed shelter.

Shelter as Cultivation

Project Lead: Maeda and Yonekawa

Location: Kosovo

Start Date: April 04, 1999

Size: N/A

Cost: N/A

Project Description:

Curtains are to be hung from the ceiling of the structure to function as a divider to create personal space for the people, and the open plan design of the walls that are filled with the debris supplied locally serve as a protector against the environment.

The walls separate and define the functions of each space. The walls are constructed with debris which can easily be supplied locally. Steel wire-mesh is filled in to create a wall. The density of wall should differ according to the environment/culture. The construction demands many workers, and the refugees can take part in building the shelters by making use of materials fatally resulted from the war or disaster.

The materials needed for the construction of the shelter included steel wire mesh for the walls, curtain for personal space, a tent sheet, and steel pipe structure for the roof and flooring.

Materials are to be distributed according to the number of family members. The mesh wall is installed with anchors, debris is crushed into the pieces to fit into the wire-mesh wall and is built into the cage. Some parts are covered with the tent roof. The curtain is hooked onto the wire strung under the roof of the shelter to create personal space. The curtains also contain pockets that allow for some storage.

Housing



Rendering of proposed design.

Fill Frame

Project Lead: N/A

Location: Guatemala

Start Date: September 24, 2007

Size: N/A

Cost: N/A

Project Description:

Fill Frame house seeks to challenge the stereotypes of temporary, transitional, and permanent housing. The design attempts to merge the three into one process of design. The title of the project developed from the idea that the majority of the design would be based on creating a structural frame which would be assembled using a variety of prefabricated components. The needed materials for construction with natural materials that could be found locally. In the case of a need for immediate temporary housing, the structural frame system makes it possible to assemble the units quickly with prefabricated pieces. The families would then be able to transform their temporary shelter into a permanent home. This process allows the families to have better living conditions throughout the whole process of reconstruction.

Paper Log House

Project Lead: Shigeru Ban

Location: Kosovo

Start Date: March 15, 1999

Size: N/A

Cost: N/A

Project Description:

The Paper Tube Structure is the structural system made-up of hollow cardboard tubes from recycled paper. PTS has been given the structural permissions from Japanese and German building authorities. A paper tube has passed the German fire retardant test for B1 grade. The Paper Log house is just a prototype which can be designed for different situations. The water protection can be provided by varnishes and films. The building design is very inexpensive because the system is made of recycled paper tubes, and is very light weight.



Examples of the paper log house shelter being implemented in the field.

Housing

Tree of Life

Project Lead: Mark Schirmer

Location: Kosovo

Start Date: March 11, 1999

Size: N/A

Cost: N/A



Image of the lighting solution of the housing design.

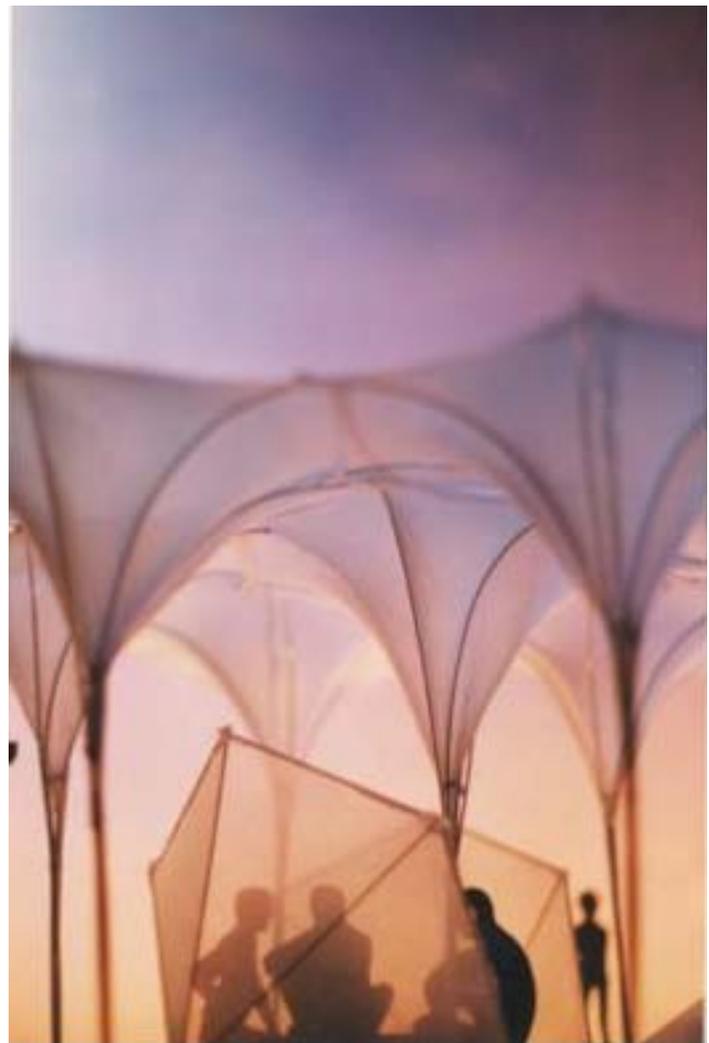


Scale model of proposed design solution.

Project Description:

The Tree of Life is a universal design system. The construction of the house would be based on the local culture and conditions. The design is a basic unit providing basic human needs for water and shelter. The idea is that people will be able to construct this shelter with no outside assistance.

The Tree of Life bases are formed and detailed on traditional temporary and portable shelters. Clustering of the units together allows for different varieties of groups. The structure is created from triangles like branches. The PV cells are a stock of solar garden lights for evening lighting. The covering is made of canvas, rugs, linens, plastic sheeting tyvek, tarp leather, or felt leaves. The triangle branches are made of wood, sticks, tree trunks, saplings, pre-cut lumber, conduit, PVC, tubing, bamboo, or steel. The covering is attached to the structure by rope, nails, screws, twine, welding or, cut wood joinery.



An image of a scale model for the proposed housing design solution.

Housing



An image of the shelter with applied materials to add personalization.

IADDIC Shelters

Project Lead: IADDIC Design Team

Location: Dallas, Texas

Start Date: February 05, 2006

Size: 180 square feet

Cost: \$400

Project Description:

The IADDIC shelter is designed to be an affordable, lightweight, mid-term shelter that is easy to transport. The features for the IADDIC shelter includes but is not limited to the following:

A complete assemble shelter "in a bag" that requires only minor finishing. The shelter has a two inch-thick insulated wall system that offers high levels of insulation that will not rot or mold. The shelter can be made to be fire resistant. It is constructed with a contiguous wall and roof design and provides a support system with load bearing capabilities. The shelter is also designed to be resistant to insects.



Image of vacuum packaged shelter.

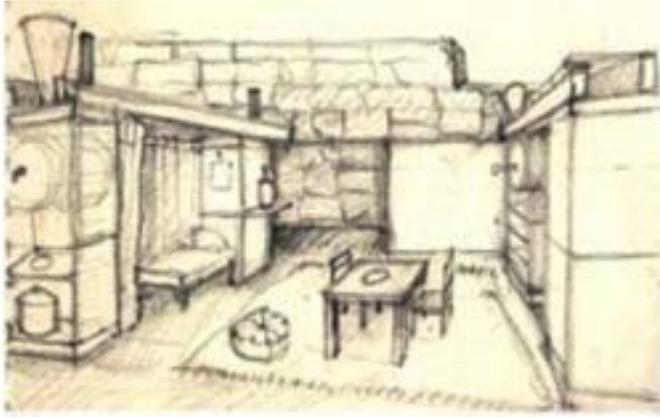
The IADDIC, is made from flexible materials, so it can be imprinted to resemble any material that is culturally normal for housing construction. The shelter is also designed to last as long as a normal dwelling would under similar conditions.

The IADDIC is a complete "building in a bag". A completely assembled IADDIC shelter is vacuum packaged into a small, compact 8 inch bag that is pictured above. When the house is removed from the packaging, the flexible materials return to their original shape. The resins cure and the structure solidifies and develops a durable exterior coating.

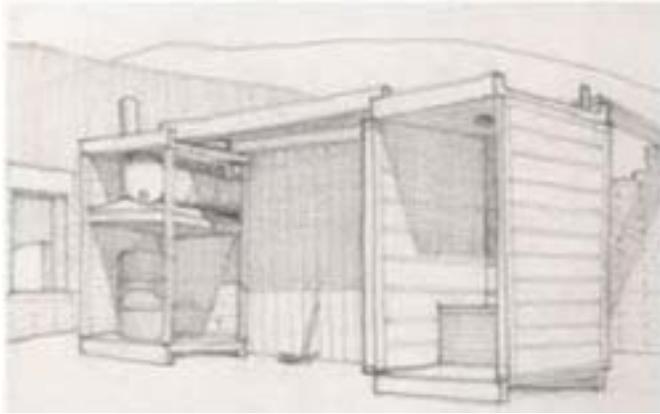


This image illustrates the shelter in its vacuumed packaged state to the fully built system.

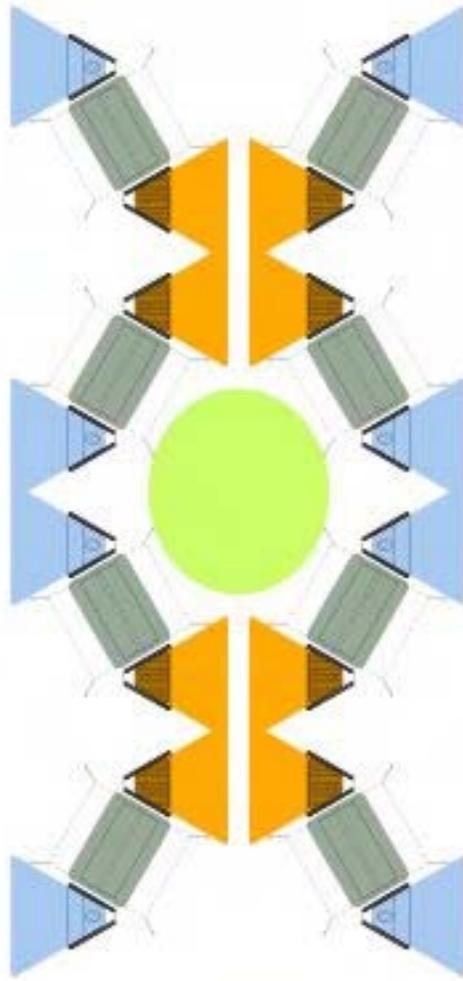
Housing



Sketch of deployed units.



Sketch of deployed units.



Possible configurations of the shelters in a camp situation.



Core unit rendering on a reconstituted house.

Extreme Housing

Project Lead: Deborah Gans and Matt Jelacic

Location: Kosovo

Start Date: March 13, 1999

Size: N/A

Cost: N/A

Project Description:

The proposed design is a system that can provide initial emergency shelter and temporary housing on the area where the permanent dwelling would be constructed. The sites will range from damaged homes, to ruins, to cleared lots and vacant spaces of cities and villages. The shelter will serve as the core and scaffolding during the reconstruction of the sites and can serve as a permanent structure supporting of the new dwellings.

The shelter structure consists of two freestanding boxes. The first is for earth with a privy. The second is for fire and water with a hearth, integral cistern, and shower. Both have components of structural galvanized steel frames, top and bottom pallets of glass-reinforced concrete and various side panels of fiberglass, corrugated metal, and metal ladder. The two systems are placed at a distance from one another to create a habitable space in between wide enough to accommodate a bed. The space in between can later be framed with beams supported by the pallets and protected with sliding doors.

When the shelter is disassembled into modular panels and stacked and tied for shipping, the two boxes have a total volume of 1130 mm square by 1100 mm high. The pallets form a protective top and bottom for the panels and various sheets of metal stacked between. The cistern barrel holds the steel brackets, hardware, miscellaneous components, and tools for the eventual resurrection of the permanent house.

Housing

Summary of Housing Research

With exploring a multitude of different prototypes and researching of current housing solutions for refugees and other temporary shelters that include shelters for the homeless or for natural disasters I have come to a few conclusions.

Most solutions to the different housing crisis around the world are mostly design as a universal solution. The designs are meant to be used anywhere and under any conditions. There is a limited selection of proposed designs that take into account local materials, building methods and environmental conditions.

Most if not all solutions propose materials and building systems that are not found locally. The materials for the housing would either have to be brought in by truck or air dropped and a few solutions can be hand carried for the areas that there is not access to. However, most solutions also need an outside source to instruct or build the housing structures because the methods are not know to the local culture especially is the design in meant to be a universal one.

There are also only a handful of solutions that deal with the problem of temporary vs. permanent. Most of the proposed solutions research are meant to only be an emergency or temporary shelter and not have the capability to become a long term or permanent housing solution. The major problem with this type of design solution is that people are not displaced for just a temporary amount of time, displacement can last centuries depending on the reason for the displacement. There is a need for a shelter that can evolve with meeting needs and not move from an emergency shelter to a temporary shelter to a permanent shelter.

A housing solution should include local materials, building methods, encompass environmental conditions, systems that can be easily taught and reproduced and a shelter to can be an emergency, temporary, and a permanent shelter.

Health-care Facilities



Health-care Facilities

Building Block Mobile Clinic

Project Lead: N/A

Location: unspecified

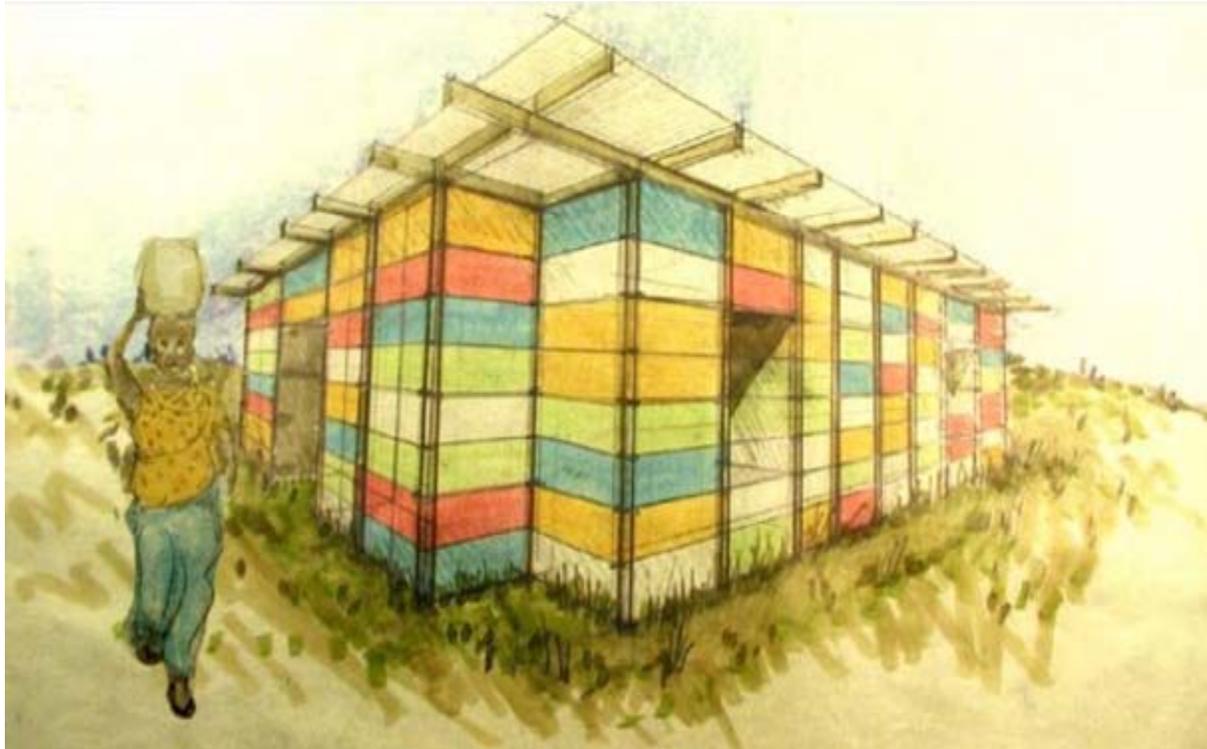
Start Date: April 02, 2007

Size: N/A

Cost: N/A

Project Description:

The mobile clinic is constructed of stacking boxes made of recycled plastics, where the supply containers and building materials are the same material. Steel reinforcing bars are used to tie the boxes together and maintain structural integrity. The clinic might be only a small stand or can be built up into a larger clinic as need requires. When the clinic becomes large enough, the roof can be replaced by a more permanent system.

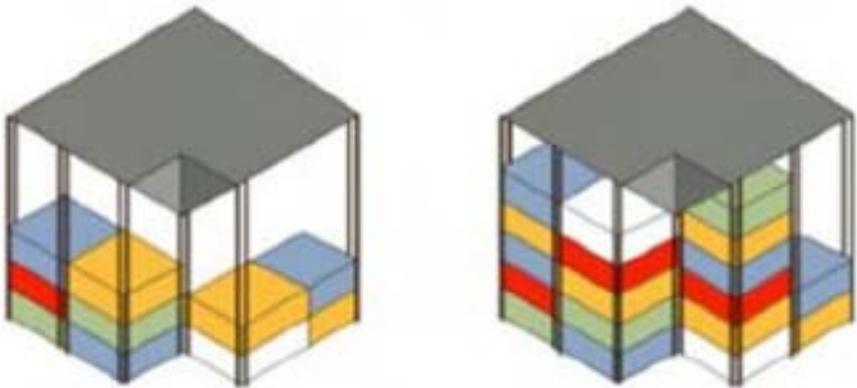


Hand rendering of exterior of the health-care facility.

Health-care Facilities



Rendering of how the boxes can be distributed.



These images demonstrate how the facility would be constructed.

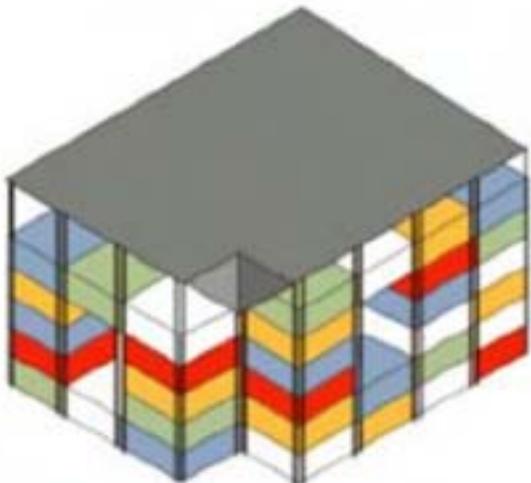


Image of the final structure for the clinic.

Health-care Facilities



Local vernacular building.

Design Build: PNG

Project Lead: Kate Ferguson

Location: Labu-tale village, Papua New Guinea

Start Date: December 07, 2006

Size: 100 square meters

Cost: \$25,000



Site visit to new village location.

33 Million Earth upheld 140

Project Description:

PNG is a project that will bring together Australian and Papua New Guinean architecture students to design and construct a community health building that includes an aid post and training room. The clinic is located in the Papua New Guinean village of Labu-Tale, Morobe Province. The students will work corroboratively with a non-government organization and village members to design a functional building that will be expressed of the traditional culture, current needs and future needs.

Rural development is a critical issue in Papua New Guinea. Basic services are needed in rural areas if Papua New Guinea's largely rural population distribution is to be sustainable. The community health building provides a facility for the people of the village with treatment services and a training room that can be used for a variety of health and community functions.



Local materials are more easily maintained.

Health-care Facilities

Gori Foundation Clinic

Project Lead: N/A

Location: Niamey, Niger

Start Date: May 30, 2007

Size: 102 square meters

Cost: N/A

Project Description:

The design is for a small clinic plus dispensary in Niamey, the capital of Niger. The Gori Foundation, a charitable organization based in Arezzo, will fund the construction and maintenance of the facility. Management of the facility would come from a local group of Italian missionaries.

The structure is simple and keeps with the local construction techniques and materials so the design endures that the extreme climate will not affect the integrity of the facility.



Digital rendering of the exterior for the clinic.

Mobile Intervention

Project Lead: Heide Schuster and Wilfried Hofmann

Location: Sub-Saharan Africa

Start Date: March 11, 2004

Size: N/A

Cost: N/A

Project Description:

The basic idea is to create a mobile vehicle which comes and goes and which provides people with necessary health-care. The clinic is composed of several elements. The walls consist of several wood or steel frames attached to a concrete foundation. The frames can be filled with a variety of materials. The design also offers other amenities such as an integrated cell phone booth or battery recharging point.

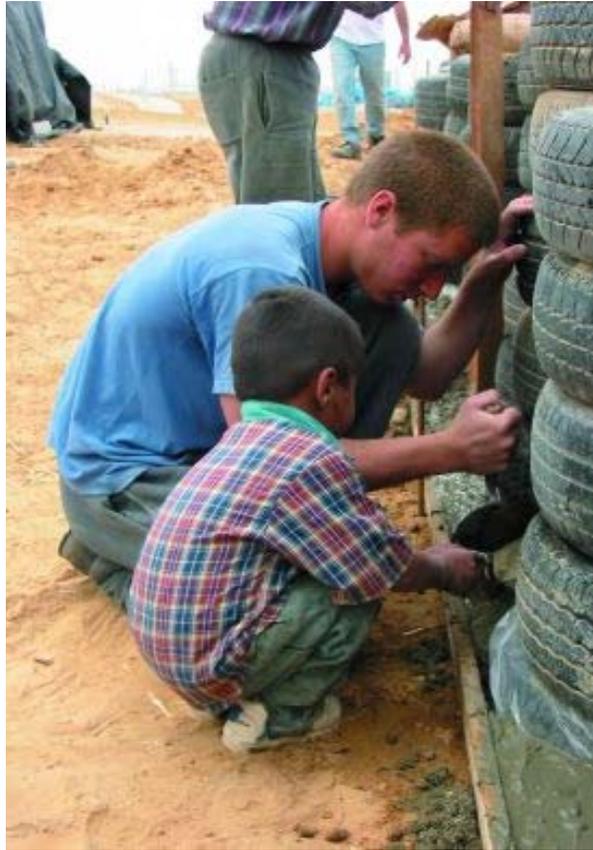
The wall of the clinic together with the vehicle will provide additional outdoor spaces. The inner compartments of the vehicle has extendable units containing different functions.

Each unit within the facility holds one or several functions. The medical unit has space for examination and treatment of patients, for laboratory facilities, and for storage and cooling of medical supply. The information unit is used for counseling and holds space for storage of hand-out material. The personal unit is the living room for the staff. It also contains a foldable beds, a small kitchen, a dining table, and a sanitary unit.



Computer renderings of the facility.

Health-care Facilities



Volunteers set tires in concrete to form a wall around the clinic, the tires are filled with sand to ensure stability.

Bustan Medwed Clinic

Project Lead: Michal Vital and Yuval Amil

Location: Wadi-Naam, Israel

Start Date: April 05, 2003

Size: 753 square feet

Cost: \$25,000

Project Description:

A home of over 4,000 Bedouins, Wadi-Naam. Negev is a triangular stretch of desert bordered by Egypt on one side and Jordan on the other. The group behind the clinic's sudden appearance was Bustan, a partnership of Jewish and Arab eco-builders, architects, academics and farmers. Because there is no access to water, electricity, sanitation, and infrastructure a self sustaining clinic was in dire need.

Health-care Facilities



Volunteers working on the exterior wall of the clinic.



The semi-translucent facade made from two layers of polycarbonate sheeting filled with twigs allows light into the interior while maintaining a sense of privacy.

Health-care Facilities



Corrugated metal sheets over the roof and moveable fins on the side mitigate solar heat gain. A drainage system and simple water barrel collect and store rainwater.



The sink supply is a plastic water jug with a screw-on cap with a tap. The sink basin is a stainless steel mixing bowl with a drainage pipe attached leading outside and hypothetically underground.

Doc-in-a-Box

Project Lead: Ted Krueger

Location: New York, New York

Start Date: January 20, 2006

Size: 160 sf

Cost: N/A

Project Description:

The design is based on a conceptual framework to convert shipping containers into small health clinics that could be delivered to under-served communities around the world. Students and faculty from the School of Architecture at Rensselaer Polytechnic Institute developed the design into a full 8' x 8' x 20' prototype. The finished design was made using materials and techniques that would be easy to replicate in many regions. The clinic includes shading devices, operable windows and doors, moveable shelving, rainwater collection, and a low-tech sink. The clinic is meant to provide primary care, vaccinations for diseases, and community support and health awareness.



When the main doors of the box are opened the inside panels, mounted with homosote or plywood, face out as a public display space for posting pamphlets, packets, and other information. Canvas curtains maintain privacy and shading while allowing airflow.

Health-care Facilities

Permanence /Mobility /Permanence

Project Lead: Gaston Tolila and Nicholas Gilliland

Location: Sub-Saharan Africa

Start Date: March 11, 2007

Size: N/A

Cost: N/A

Project Description:

The mobile clinic is to provide medical services to the isolated villages of Sub-Saharan Africa where no aid is provided. The clinic should be accepted by the local population by the use of materials and construction methods.

The clinic's purpose is designed in two distinct parts. One part is that it part permanent and part mobile. The permanent component is composed of one or two granaries constructed in local materials, by the local inhabitants several weeks before the arrival of the clinic.



A scale model of the proposed clinic design.



Computer rendering of the clinic design.

The mobile component arrives by small truck with the medical team. The interior elements include sterile pods in flexible synthetics which hang from metallic poles and the existing granaries. They are designed to be easily adaptable to granaries of varying forms and materials, regular and irregular, according to the standard local craft.

The exterior is composed of local African fabrics that provides protection from the sun. The exterior spaces are used for the of education, consultation and care, underneath the African fabric. When the clinic leaves the village, the earthen granaries remain, and can be used for the storage of medicine and to assure a place of permanent contact for the care and information of local inhabitants.

Health-care Facilities



Straw bale walls.

Santo Niño Clínica Guadalupeana

Project Lead: Alfred von Bachmayr

Location: Anapra, Chihuahua

Start Date: May 09, 2004

Size: 1,625 square feet

Cost: \$16,000

Project Description:

Two straw bale additions to a cinder-block original structure to add needed space for treatment of children with neurological disorders. The structural systems include pallet truss roof, load-bearing straw bale walls, packed tire foundations.



Tire foundation.

Visitation Hospital

Project Lead: Alan Dooley

Location: Petite Riviere, Haiti

Start Date: January 29, 2007

Size: 4,000 square feet

Cost: \$250,000



Computer rendering of hospital.

Project Description:

Visitation Hospital, is a comprehensive care facility in a rural part of the poorest country in Haiti to serve the desperate medical needs of thousands. The facility will also serve to educate to prevent illness, saving lives. The system uses solar panels for electricity and is naturally ventilated. Most of the materials will be gathered locally and the local construction methods.



Image of building walls.

Health-care Facilities

Summary of Health-care Facilities Research

With exploring a multitude of different prototypes and researching of current health-care solutions for refugees and other facilities shelters for natural disasters victims. I have come to a few conclusions.

Most solutions to the different health-care crisis around the world are mostly design as a universal solution. The designs are meant to be used anywhere and under any conditions. There is a limited selection of proposed designs that take into account local materials, building methods and environmental conditions.

Most if not all solutions propose materials and building systems that are not found locally. The materials for the health-care facilities would either have to be brought in by truck or air dropped, but most solutions are not designed to be permanent but a traveling health-care facility that can come and go. However, most solutions also need an outside source to instruct or build the structures because the methods are not know to the local culture especially is the design in meant to be a universal one.

There are also only a handful of solutions that deal with the problem of temporary vs. permanent. Most of the proposed solutions research are meant to only be an emergency or temporary shelter and not have the capability to become a long term or permanent health-care facilities. The major problem with this type of design solution is that people are not displaced for just a temporary amount of time, displacement can last centuries depending on the reason for the displacement. Plus health-care is not a problem that comes and goes but is a constant problem in areas of need and there is a need for health-care facilities that are constant. There is a need for a facilities that can evolve with the meeting needs and not move from an emergency facility to a temporary facility to a permanent facility.

A health-care solution should include local materials, building methods, encompass environmental conditions, systems that can be easily taught and reproduced and a shelter to can be an emergency, temporary, and a permanent shelter.

Education Facilities



Education Facilities



Image of existing structure.

Community School

Project Lead: UNIFI, AftH

Location: Umeze, Nigeria

Start Date: June 12, 2007

Size: N/A

Cost: N/A

Project Description:

Two straw bale structures were added to a cinder-block structure to add space for treatment of children with neurological disorders. The structural system includes pallet truss roof, load-bearing straw bale walls, packed tire foundations.



Image of completed project.

White Orchid

Project Lead: N/A

Location: Philippines, Indonesia

Start Date: June 30, 2007

Size: N/A

Cost: N/A

Project Description:

White Orchid is a project for girls rescued from the sex trade, currently concentrating in Asia. Building schools for rehabilitation and education. Each school will be sustainable and also be used as a reserve for rescued animals. Reefs will be cultivated to create more breeding environments for marine life. All facilities normally in other schools will be present, but with added rooms including a medical wing, counseling rooms, science wings, a botanical garden, a waterfall room, a Japanese stone garden, an art gallery, a marine lab, a boat house, and beach huts.

The area is 380,000 square meters. The building will employ elements of local methods, native materials, possibly elements of Japanese architecture as well as innovation suited for sustainable design. Other issues considered are alternate energy sources and water and waste treatment.



Traditional philippino architecture.

Education Facilities

Primary School in Southern Sudan

Project Lead: Architecture for Humanity Italy - Genoa

Location: Central Equatorial State Sudan, Africa & Arab States

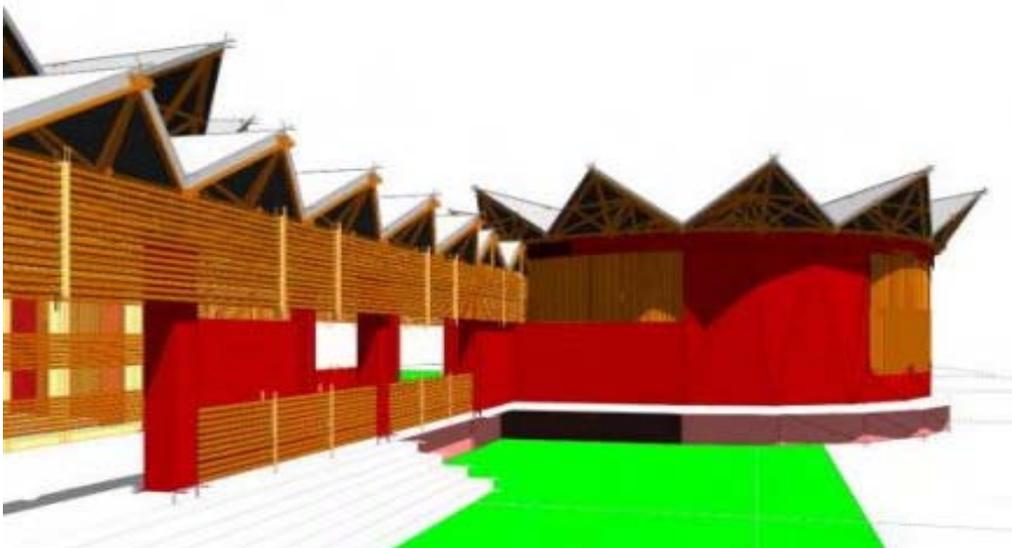
Start Date: November 05, 2006

Size: N/A

Cost: \$120,000

Project Description:

The project purpose is to locate primary school widely on the territory aiming at keeping the students in relation with their environment. That choice allows to satisfy the lack or the absence of transportation support; the initiative foresees even the inclusion of health care areas that could permit to keep the people health conditions under control, and not only students. Potable water as one of the major problems continuously faced in Southern Sudan has been taken into consideration in the project. Its solution is proposed in the project is made by introducing green building principle which exploits the rain-water. The collected water will be used then in the school services. The water collection site may change following climate differences. Mechanical system support could be used where its necessary. Learning and teaching processes will be facilitated by creating autonomy in resources and services supply inside the school. The strategy of the project is also to create local sustainability not only by using local raw materials, but also by using the local human resources, thus creating self-reliant economy.



Project layout.

Education Facilities



Site inspection.



Project layout.

Education Facilities



Tanzania school model.

Ipulí Rural Center of Excellence, Tanzania

Project Lead: Nicholas Gilliland and Gaston Tolila, France

Location: Ipulí, Iramba District, Tanzania

Start Date: September 08, 2005

Size: 4,456 square feet

Cost: N/A

Project Description:

The village of Ipulí is located in the region of Singida, Tanzania, located in Eastern Africa. which has a population of 950,000. Located in the heart of the country, the village has rich earth, an unworkable school, and no doctor. Tanzania has only one physician for every 20,511 people, and women in labor must travel an average of 60 kilometers through rough terrain to reach the nearest clinic. As a result many die. The community needed a medical center to serve the entire population of Ipulí while focusing on the health needs of women of reproductive age and children under the age of five.

The "Rural Center of Excellence" will include the Mother-Child Medical Center, a health center providing care to local mothers and their children which will also have equipment linking the center to other health centers all over the world.

The facility is composed of two elements. One being a maternity ward and a clinic for regular care to the mother-child population, and a staff dormitory for visiting healthcare providers and innovative spaces for public education and interaction.

The second element within the "Rural Center of Excellence" will be a joint primary and secondary school for children and young people, and it would be built next to the health center. The school will incorporate formal education and "non-traditional" education that provides space and equipment to encourage technological innovation.



Rendering of interior of the medical clinic.

Education Facilities

Summary of Education Facilities Research

With exploring a multitude of different prototypes and researching of current education facilities solutions. I have come to a few conclusions.

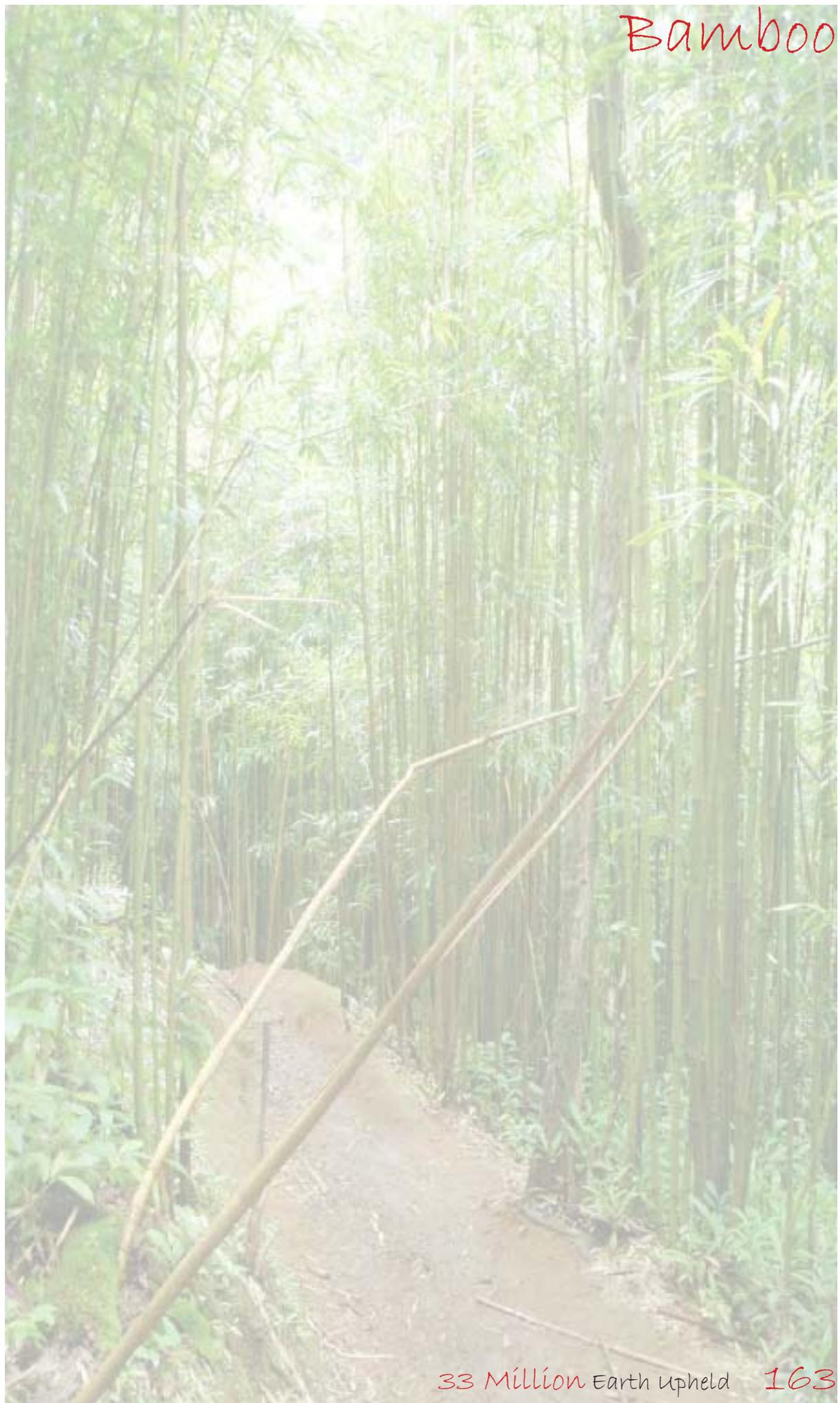
Currently there are no design solutions for education facilities for refugee camps or another emergency or temporary area. Some solutions researched have dealt with villages in developing countries in poor urban communities and villages.

A education facility design solution should include local materials, building methods, encompass environmental conditions, systems that can be easily taught and reproduced and a shelter to can be an emergency, temporary, and a permanent shelter.



- 163 Bamboo
- 167 Straw Bricks
- 171 Goat Hair
- 175 Thatch
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Bamboo



Bamboo

There are ninety-one different genera and about a thousand different species of bamboo. Bamboo can be found in diverse climates, from cold mountains to hot tropical regions, including in sub-Saharan Africa. New shoots of some of the larger species can grow over one meter per day and grow to full structural strength in six weeks. A five inch diameter bamboo cane has the same or greater strength as a 6" x 6" piece of structural lumber.

There are two general patterns for the growth of bamboo, clumping and running. Clumping bamboo species tend to spread slowly as the growth pattern of the rhizomes is to simply expand the root mass gradually. Running bamboo on the other hand need to be taken care of in cultivation because of the plants potential for aggressive behavior. They spread mainly through their roots, which can spread widely underground and send up new shoots to break through the surface. Running bamboo species are highly variable in their tendency to spread. Some can send out runners several meters a year, while others can stay in the same general area for long periods. Once established as a grove, it is difficult to completely remove bamboo without digging up the entire system.



Right: Image of young bamboo grove.



Left: Fully developed structural bamboo.



A basket that has been weaved about of pieces of bamboo..

The new bamboo shoots, that come out of the ground, are edible. They are used in numerous dishes and broths because it is a low calorie source of potassium. The sap of young stalks when tapped during the rainy season may be fermented to make ulanzi, a sweet wine, or made into a soft drink. Bamboo is also used in medicine for treating infections. The empty hollow in the stalks of larger bamboo is often used to cook food in many cultures.

When treated, bamboo forms a very hard wood which is both light-weight and exceptionally durable. In tropical climates it is used in elements of house construction, for fences, bridges, toilets, walking sticks, canoes, tableware, furniture, chopsticks, food steamers, toys, construction scaffolding, as a substitute for steel reinforcing rods in concrete construction, hats, and martial arts weaponry, including fire arrows, flame throwers and rockets.

Bamboo canes are normally round in cross-section, but square canes can be produced by forcing the young shoot through a tube of square cross-section slightly smaller than the shoot's natural diameter. The fiber of bamboo has been used to make paper in China since early times. The wood is used for knitting needles and the fiber can be used for yarn and fabrics.

Straw Bricks



Straw Bricks

A straw brick is made of clay mixed with water and an organic material such as straw or animal dung. The soil composition typically contains clay and sand. Straw or animal dung is useful in binding the brick together and allowing the brick to dry evenly. The mixture is roughly half sand (50%), one-third clay (35%), and one-sixth straw (15%).

Bricks are made in an open frame of a convenient size. The mixture is molded by the frame, and then the frame is removed quickly. After drying a few hours, the bricks are turned on edge to finish drying. Slow drying avoids cracking. The same mixture to make bricks, less the straw, is used for mortar and often for plaster on interior and exterior walls as protection from the elements.

A straw brick wall can serve as a significant heat reservoir. A south facing wall may be left uninsulated to moderate heating and cooling. Ideally, it should be thick enough to remain cool on the inside during the heat of the day but thin enough to transfer heat through the wall during the evening.

Brick walls usually never rise above two stories because they have low structural strength. When putting in window and door openings, a lintel is placed on top of the opening to support the bricks above. Within the last courses of brick, bond beams are laid across the top of the bricks to provide a horizontal bearing plate for the roof to distribute the weight more evenly along the wall.



One possible configuration of stacking the bricks in a non-traditional manner.

Straw Bricks



The process of making straw bricks using a simple mold..



straw bricks drying in the sun light.

Goat Hair



Goat Hair

Domestic goats are one of the oldest domesticated species. For thousands of years, goats have been used for their milk, meat, hair, and skins. A goat is useful to humans both alive and dead, first as a renewable provider of milk and fibre, and then as meat and hide. Some charities provide goats to farmers and families in poor countries, because goats are easier and cheaper to manage than cattle.

Some goats are bred for the fiber from their coats. Most goats have softer insulating hairs nearer the skin, and longer guard hairs on the surface. The desirable fiber for the textile industry is the softer hairs, and is also known as mohair, fleece, goat wool, or cashmere.

The fiber is made into products such as sweaters and doll's hair. Both cashmere and mohair are warmer per ounce than wool and are not scratchy or itchy or as allergenic as wool. Both fibers command a higher price than wool, compensating for the fact that there is less fiber per goat than there would be wool per sheep. The longer guard hair has been discovered to act as a rain barrier. When the hair is woven and becomes wet the fibers swell and becomes tight creating a solid material.



Goat hair made into fabric.



Some goat species hair can grow to over a foot in length.

Goat skin is still used today to make gloves, boots, and other products that require a soft hide. Other parts of the goat are also equally useful. The intestine is used to make "catgut" that is used as a material for internal human sutures. The horn of the goat is also used to make spoons among other things. Rarely, goats will be used as light pack animals and to draw small carts. Many farmers use inexpensive goats for brush control, leading to the use of the term brush goats.



Goat hair can be dyed to any color.

Thatch



Thatch

Thatching is the covering of a roof with vegetation such as straw, water reed, sedge, rushes and heather. It is probably the oldest known roofing material, and is still employed by builders in developing countries. Thatch grows on every continent except Antarctica.

In some countries thatch is the prevalent local material for roofs, and often walls. The traditional material in most of England is wheat straw, which is now produced by specialist growers. Good quality thatching straw can last for more than forty-five to fifty years when applied by a skilled thatcher. A new layer of straw is applied over the weathered surface. This process has thatched roof to be over two meters thick. Some preserved ancient buildings have layers of thatch that is over six hundred years old.



A woven run or floor mat.



Example of a thatched roof.

Water reed, which was used in East Anglia and Eastern England, is a one-coat material. Weathered reed is usually stripped and replaced by a new layer. Although water reed has been known to last for more than seventy years on steep roofs in dry climates.

Thatch is fastened together in bundles with a diameter of about two feet. These are then laid on the roof with the butt end facing out and secured to the roof beams, after which they are pegged in place with wooden rods. The thatcher adds the layers on top of each other, finishing with a layer to secure the ridgeline of the roof. Thatch roofs do not catch fire any more frequently than roofs covered with other materials, but thatch fires are difficult to extinguish once they take hold.

Rice



Rice



Wet rich grown in a patty filed.



White wet Asian rice.

33 Million Earth upheld 180

Domesticated rice has two species the, *Oryza sativa* and *Oryza glaberrima*. These plants are native to tropical and subtropical southern Asia and southeastern Africa. Rice provides more than one fifth of the calories consumed worldwide by humans. Rice can grow from one to two meters in height, and more depending on the variety and soil fertility. The grass has long, slender leaves fifty to hundred centimeters in length and about two centimeters wide. Small flowers are produced in a branched configuration to about thirty to fifty centimeters in length. The seed is a grain of five to twelve millimeters in length and two to three millimeters wide.

Rice is a large part of the world's human population, especially in East, South and Southeast Asia, making it the most consumed cereal grain. Rice cultivation is well-suited to countries and regions with low labour costs and high rainfall, as it is very labour-intensive to cultivate and requires plenty of water for irrigation. Rice can be grown practically anywhere, even on steep hillsides. Although its species are native to South Asia and certain parts of Africa, centuries of trade and exportation have made it commonplace in many cultures.

African rice has been cultivated for thirty-five hundred years. Between 1500 and 800 BC, it grew from the Niger River delta to Senegal. Its cultivation has declined in favour of the Asian species.



Small grains of Asian white rice.

Thorn Bush



Thorn Bush

The Black Monkey thorn tree is a deciduous, medium to large tree, growing up to twenty-five meters. The tree is found from S.E. Zimbabwe in the North to Kwazulu-Natal in the south.

This tree grows on a variety of soils, in thornveld, mixed woodland and rocky slopes. It will produce yellow-white flowers from October to January.

The timber of the tree is used for furniture manufacture. Being termite resistant it was used for fence poles. The leaves and the highly nutritional pods are eaten by game. The branches of the tree and the bush can be used as screen protection from animals and a security fence. The bark and leaves are used medicinally for cures to illnesses.

The bark of the tree and its seeds provides food for game, such as giraffes, impala, and steenbok, as well as for people.



Thorn bush used as a security fence.

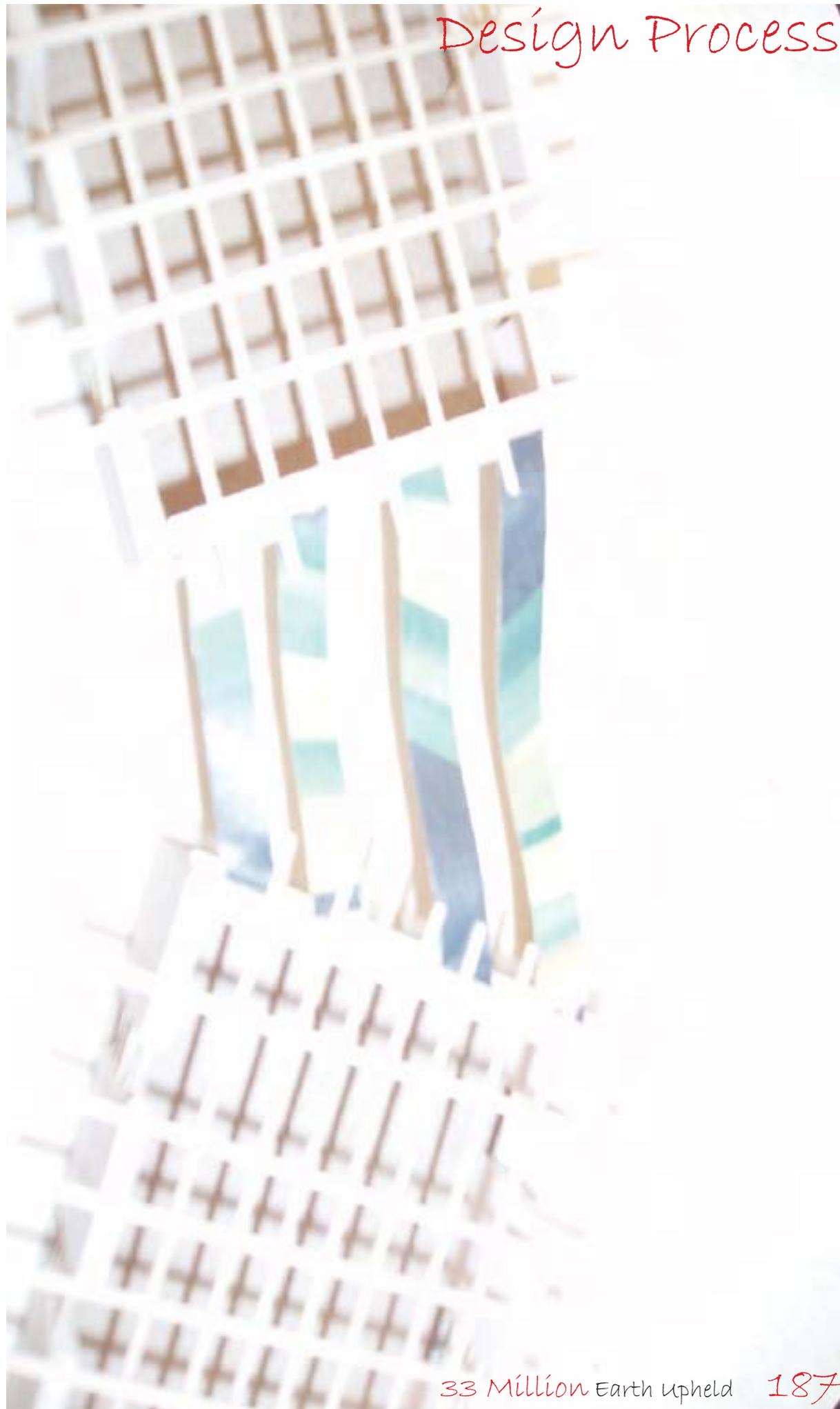


Monkey seeking shelter in the African thorn tree.



Close up of the thorns or needles.

Design Process





191 Material Studies

199 Study Models

205 Master Plan

35 Building Design



Through the course of the semester there were several explorations and studies of some of the materials that would be used in the design of the buildings and systems with the camp.

The exploration of with the materials was with bamboo and twine as the connector. A bookshelf was but using only bamboo and twine as the materials and a minnie hand saw was the only tool. One to two inch bamboo canes were cut into the desire lengths to create the bookshelf. Then two different notching systems were used for the connection of the bamboo pieces together. The first was to notch out a piece of the bamboo about one or two inches in length that cut halfway through the cane on only one piece that was to be connected. The other notching system was to cut notches into both pieces of bamboo that needed to be connected. Once all pieces were cut and notches made using that hand saw the twine was cut into four foot pieces in length. The twine was then raped around the area or bamboo were it was notched using the Japanese knotting method. A bookshelf was the end result.

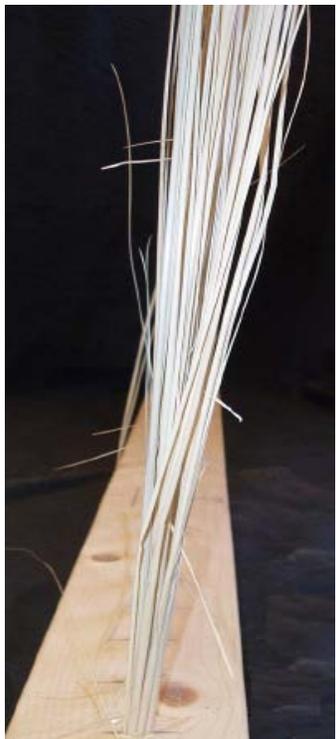
The next exploration was to represent and explore the processes using thatch and how to weave the materials together. A 2" x 4" was cut into two pieces and several holes were drilled into each piece. Next several pieces of plant material were place into the holes and then the same materials was weaved in between the vertical pieces.

The final material exploration was to make straw bricks. Two different mold were constructed. One used 2" x 6" to make the blocks and the other used 2" x 4" to make the bricks. Each mold was cut to size and screwed together. The next step was to mix the materials to make the straw blocks and bricks. The mixed was sixty percent sand, thirty percent clay dirt, and ten percent straw. Water is added until the mixture is the consistency that of cement when mixed. The mix was then added the mold using a trowel. The bricks and blocks are only to sit in the mold for fifteen minutes then the mold is removed. The bricks are then left to dry for several days and the larger blocks can take up to a week to dry. Once the blocks and brick were dried a motor was made using the same mixture for the bricks minus the straw. The block and bricks were then stacked to create different wall studies. The blocks were used with bamboo to represent an opening in a building wall and the smaller bricks was an attempt to create a wall that curved in two different directions.

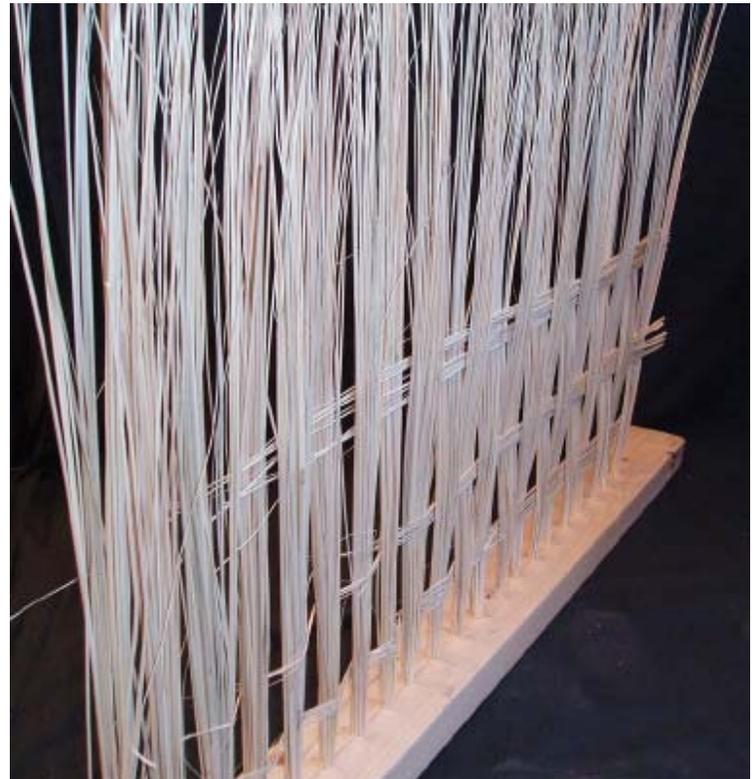
Material Studies



Thatch weaving material study model.



Side view of the thatch weaving material study model.



Angle view of the thatched weaving material study model.



Close-up image of the thatched weaving material study model.

Material Studies



Front view of the straw block material study model of an opening in a wall of a building.



Detailed view of the straw block material study model showing the connection between the wall and the bamboo.

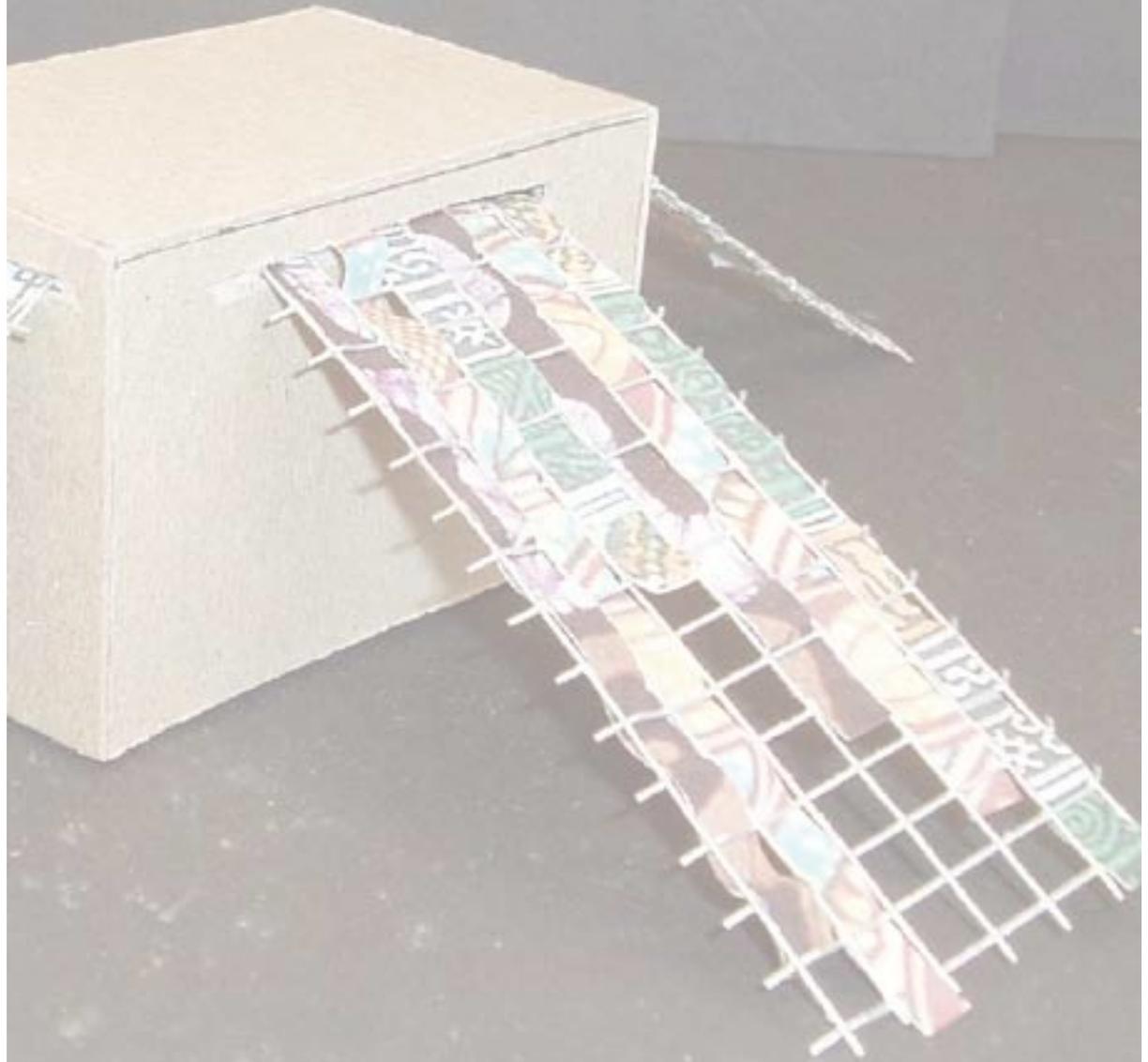


Detail view of the straw brick study material model showing the wall that would curve in two directions.



Top view of the straw brick material study model showing the wall that would curve in two directions.

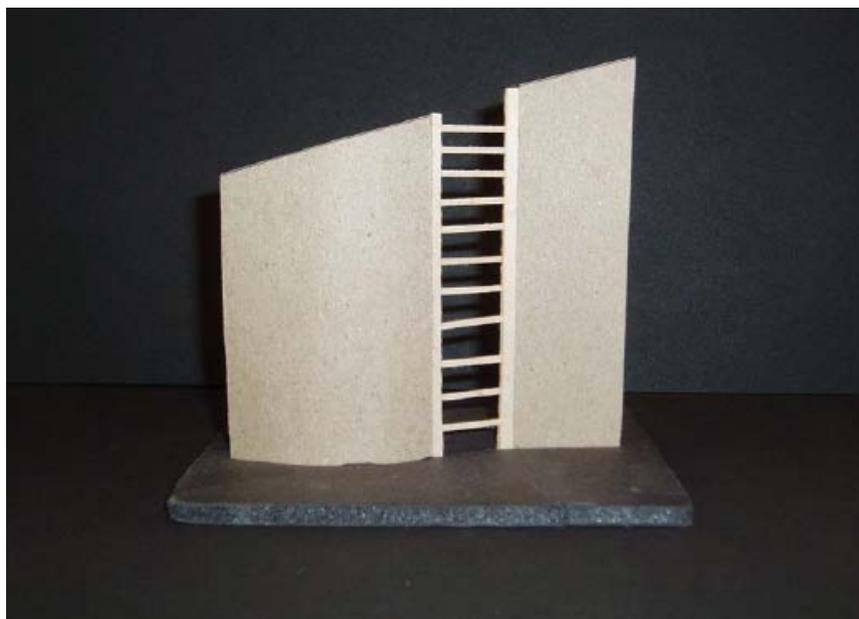
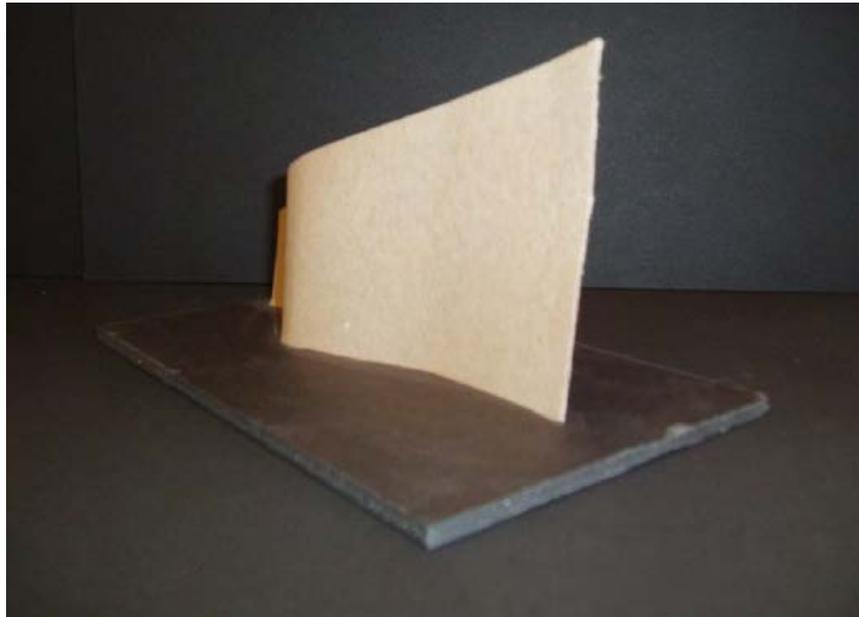
Study Models



Study Models

Wall Studies

The models picture below was an exploration for the wall design. The study of how the walls could possible curve and playing with the angle of what would be the roof line. The models also explored how would on opening into the wall be expressed depending on fit it would be a doorway or window opening. The window opening would be expressed vertically by being the full length of the wall and expressed horizontally with the bamboo to create a divider between the inside and the outside of a building.

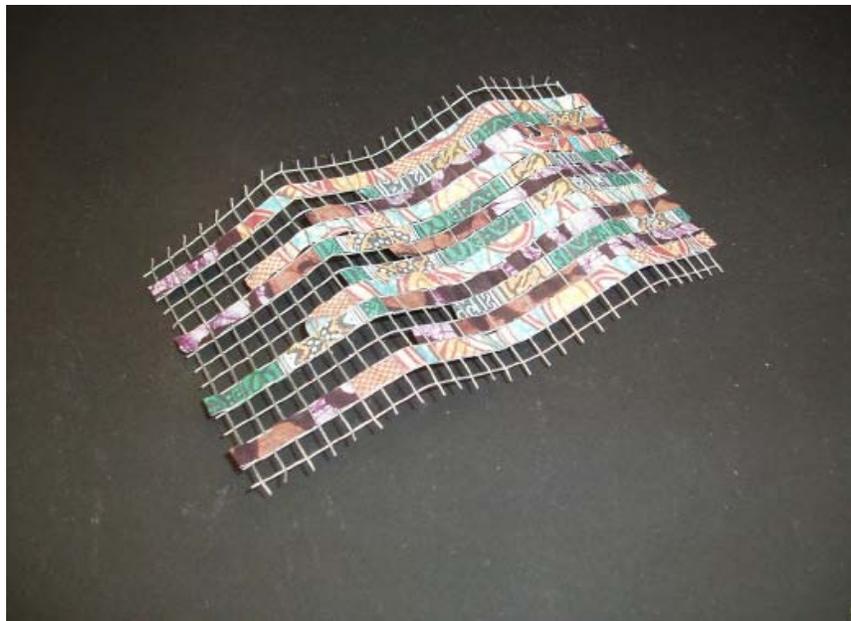
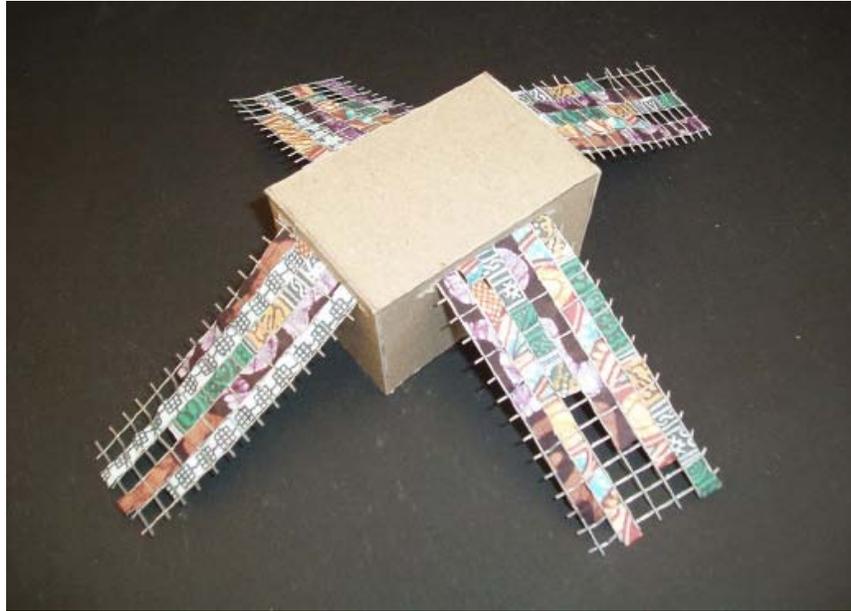


Study Models

Wall Studies

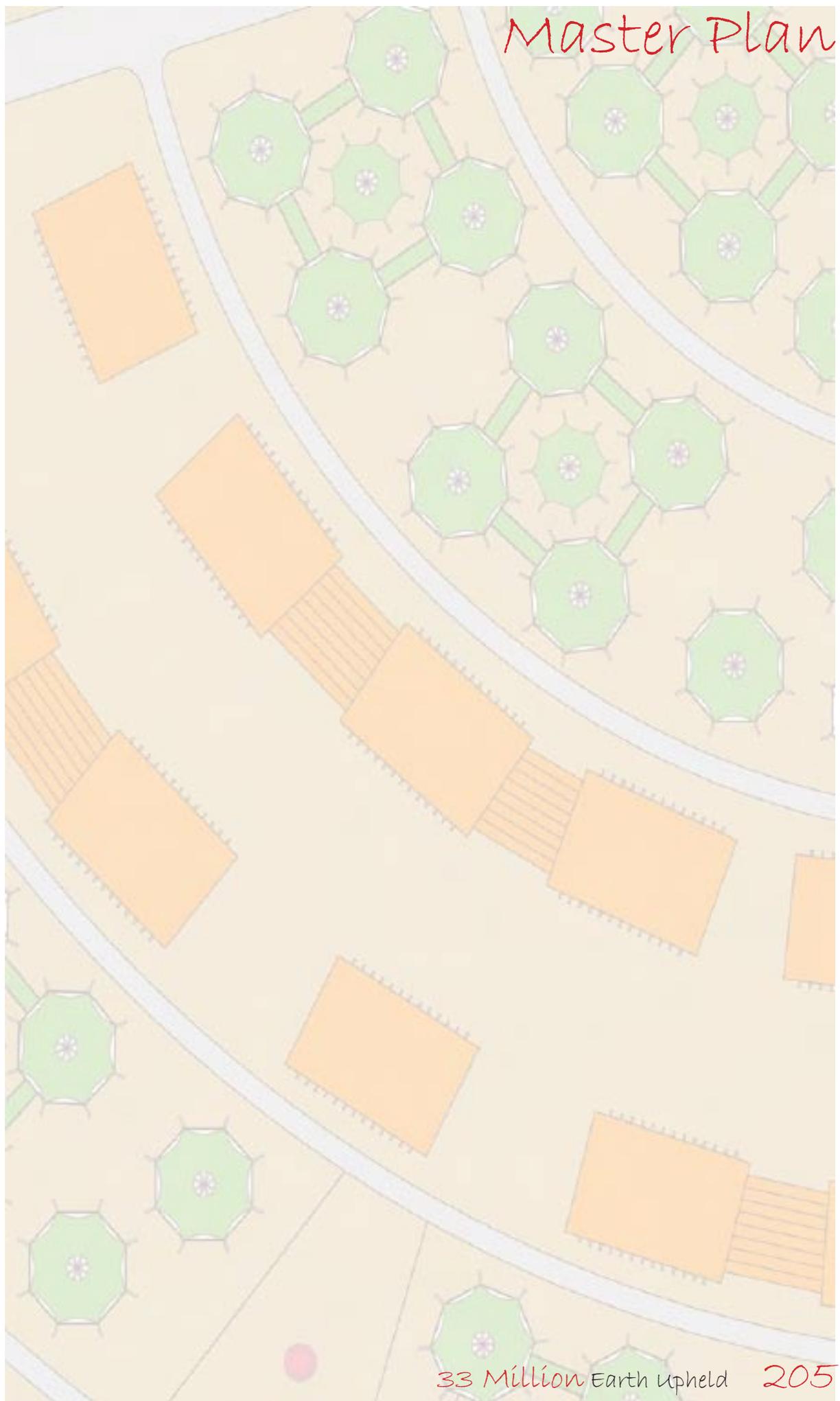


The models picture above was an exploration for the wall design. The study of how the walls could possible curve in tow different directions. The models show two different ways that the straw bricks could be organized to create a wall that curves not only vertically but horizontally as well. The idea behind the two directional curving wall was to show how the straw bricks could be expressed and what design possibilities the bricks were capable of.



The models picture above was an exploration for the use of the goat hair fabric. The idea would be pieces of the goat hair fabric that could attach to the side of a building and be pulled out to created not only shelter for the sun but an exterior space for people to interact or outdoor classroom or an outdoor clinic area for the people when the need for space is in higher depend. The fabric panels could be removed when the need is not there are removed and used for something else.

Master Plan



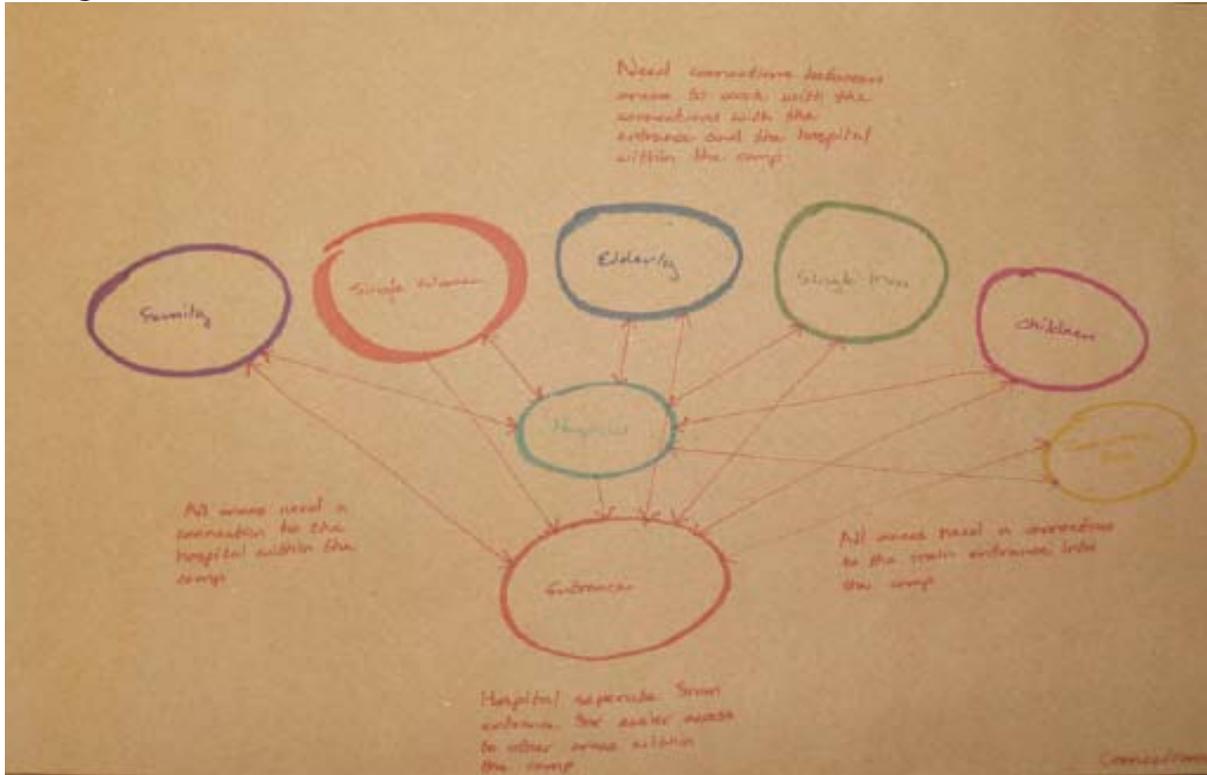


208 Camp Design

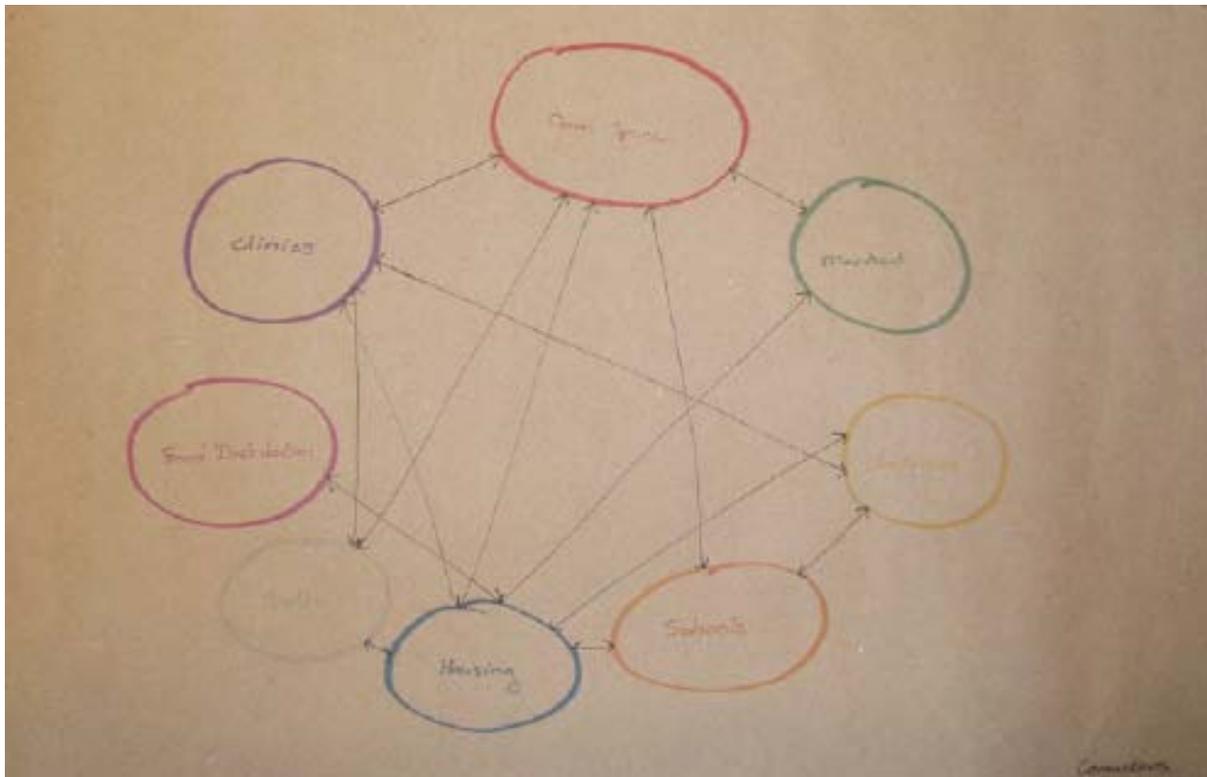
216 Sector Design

Camp Design

Diagrams



The diagram shows the major connections between areas within the camp if the areas are placed in a linear pattern.

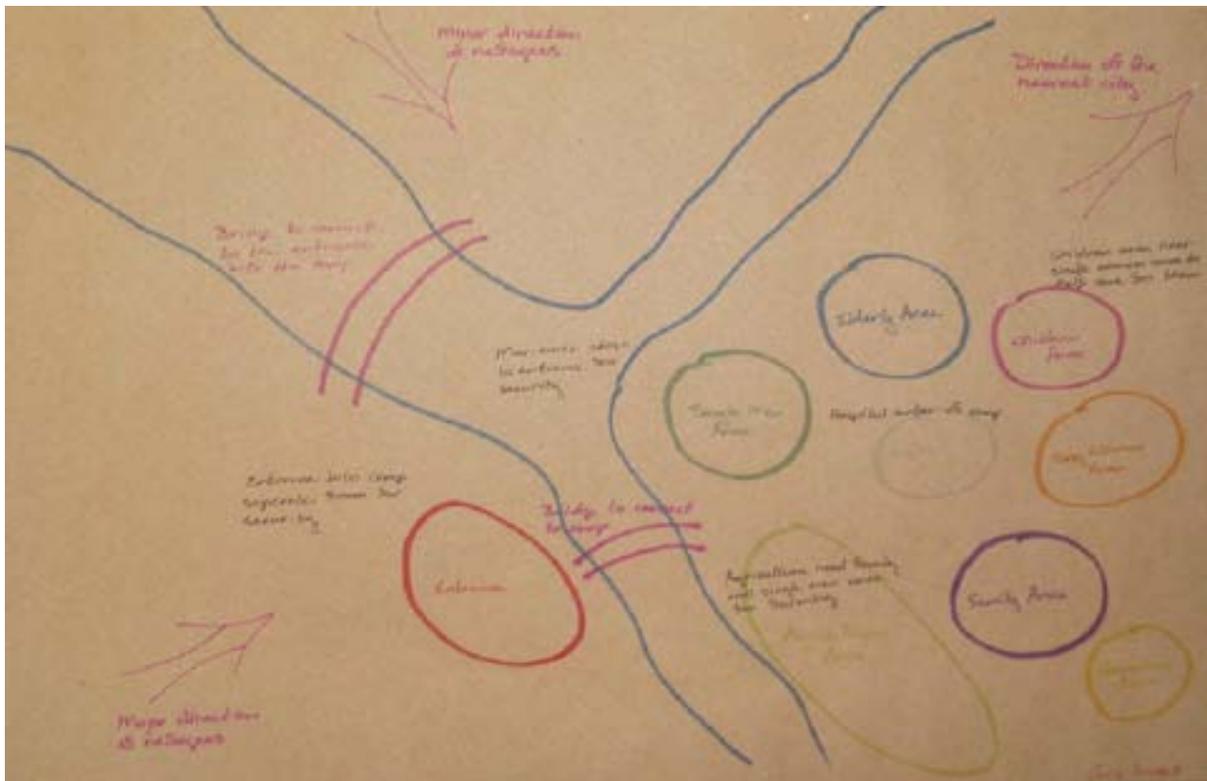


The diagram shows the major connections between areas within the camp if the areas are placed in a circular pattern.

Camp Design Diagrams



The diagram shows a possible layout and connections of the sectors within the camp.

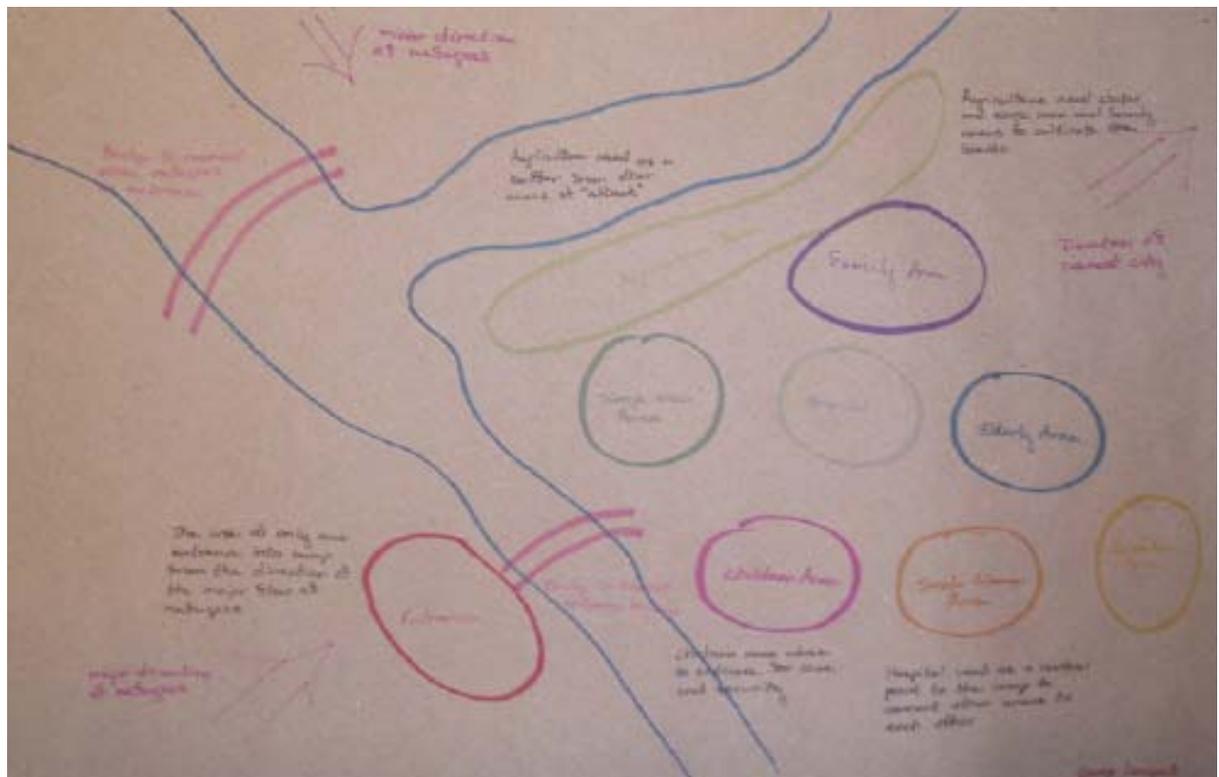


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Camp Design Diagrams

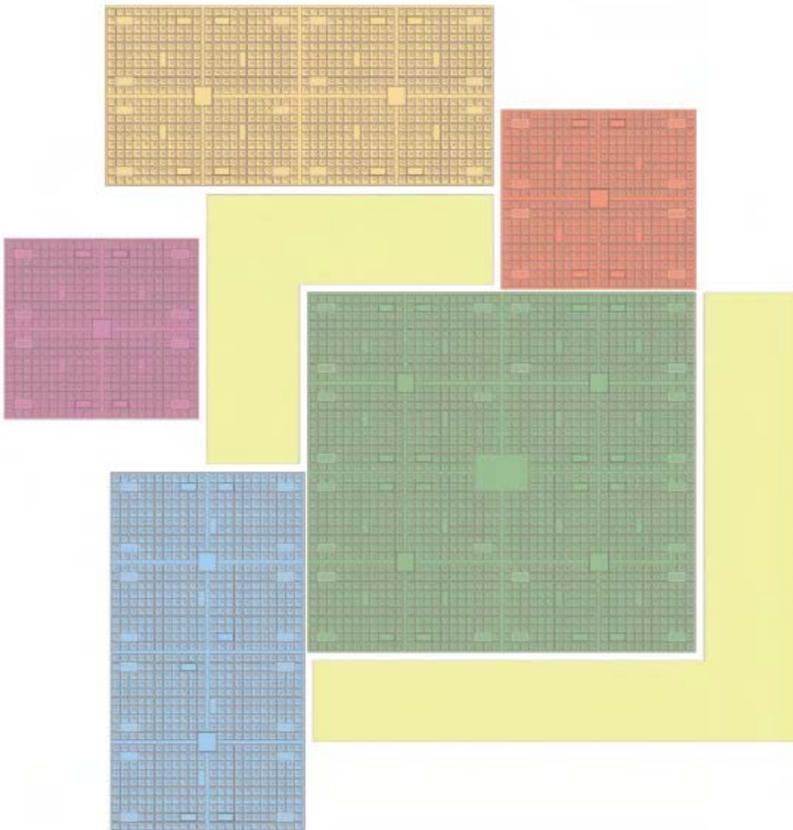
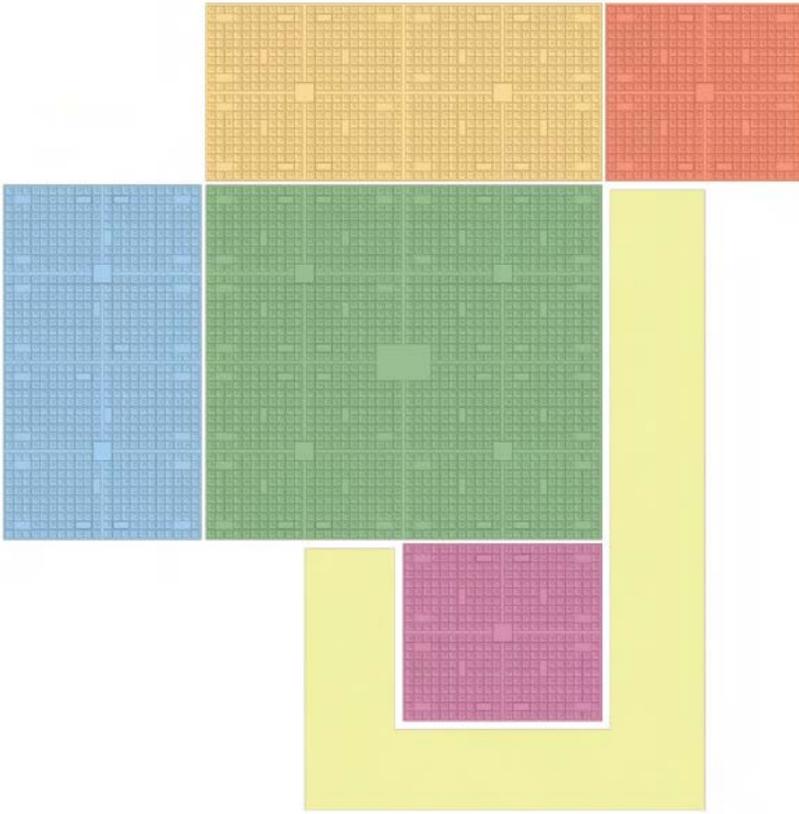


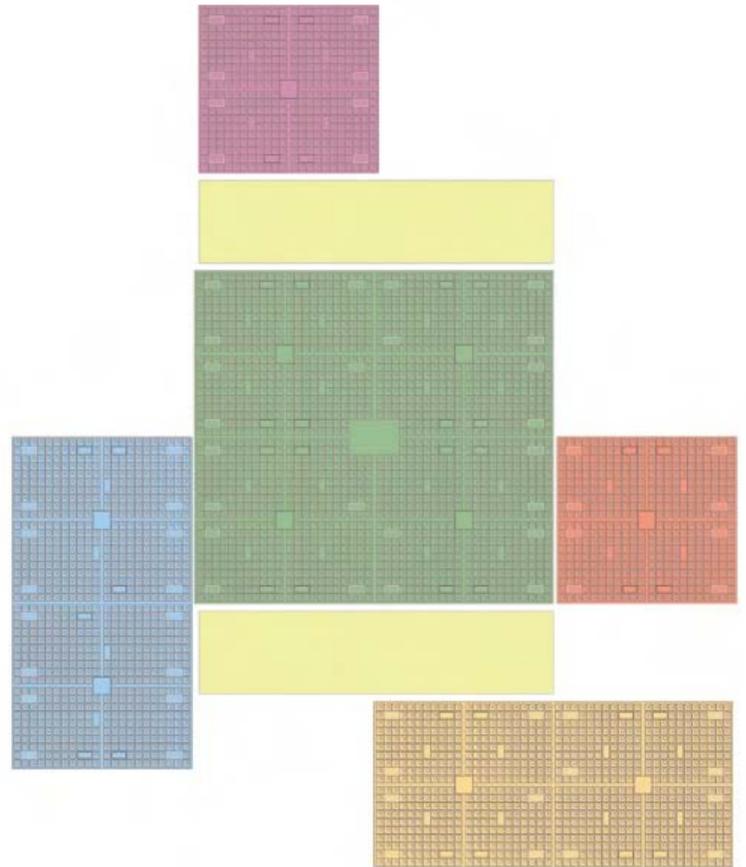
The diagram shows a possible layout and connections of the sectors within the camp.



The diagram shows a possible layout and connections of the sectors within the camp.

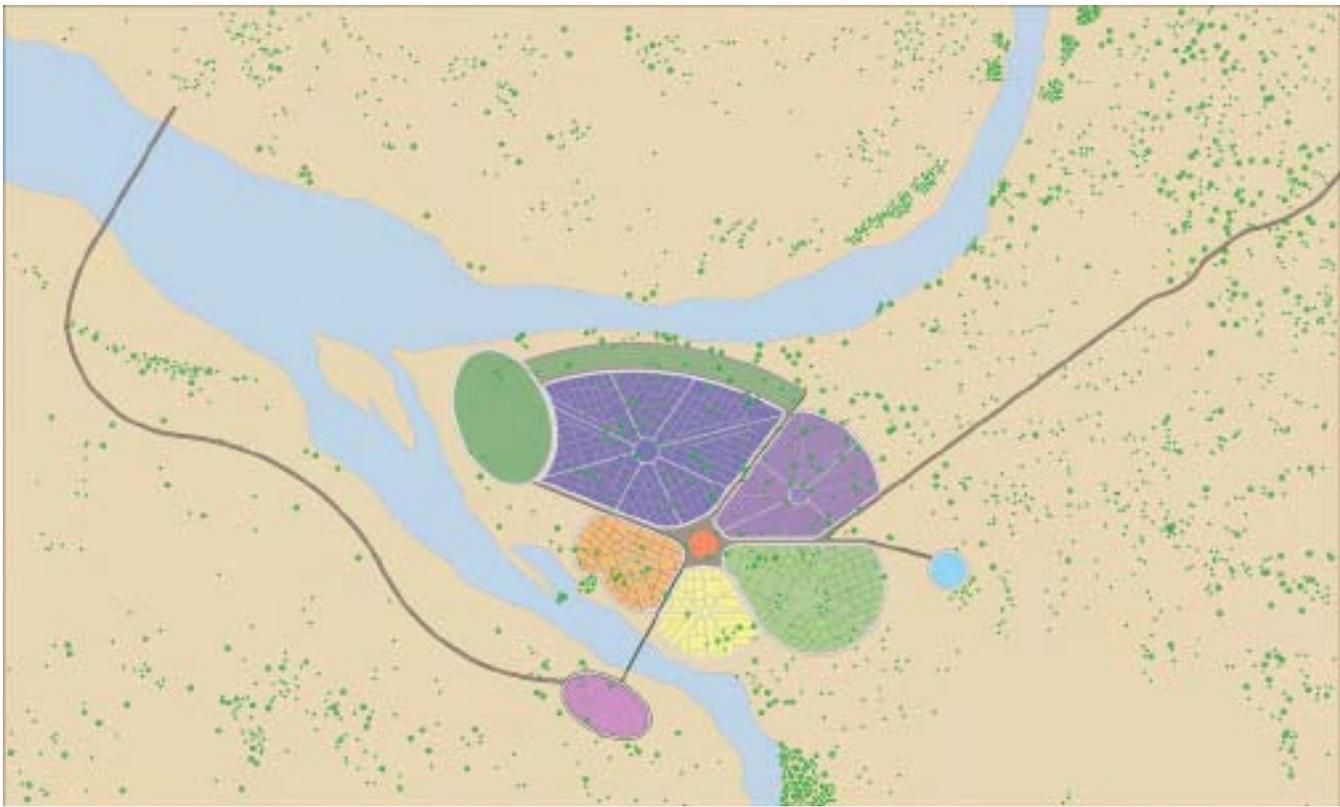
Camp Design





The diagrams show different possibilities for the layout of the overall camp configuration. The diagrams explore how the major sectors would interact with one another based on the size of the sectors needed for a camp of twenty thousand people based on research from the United Nations and the number of refugees and IDPs that register.

Camp Design



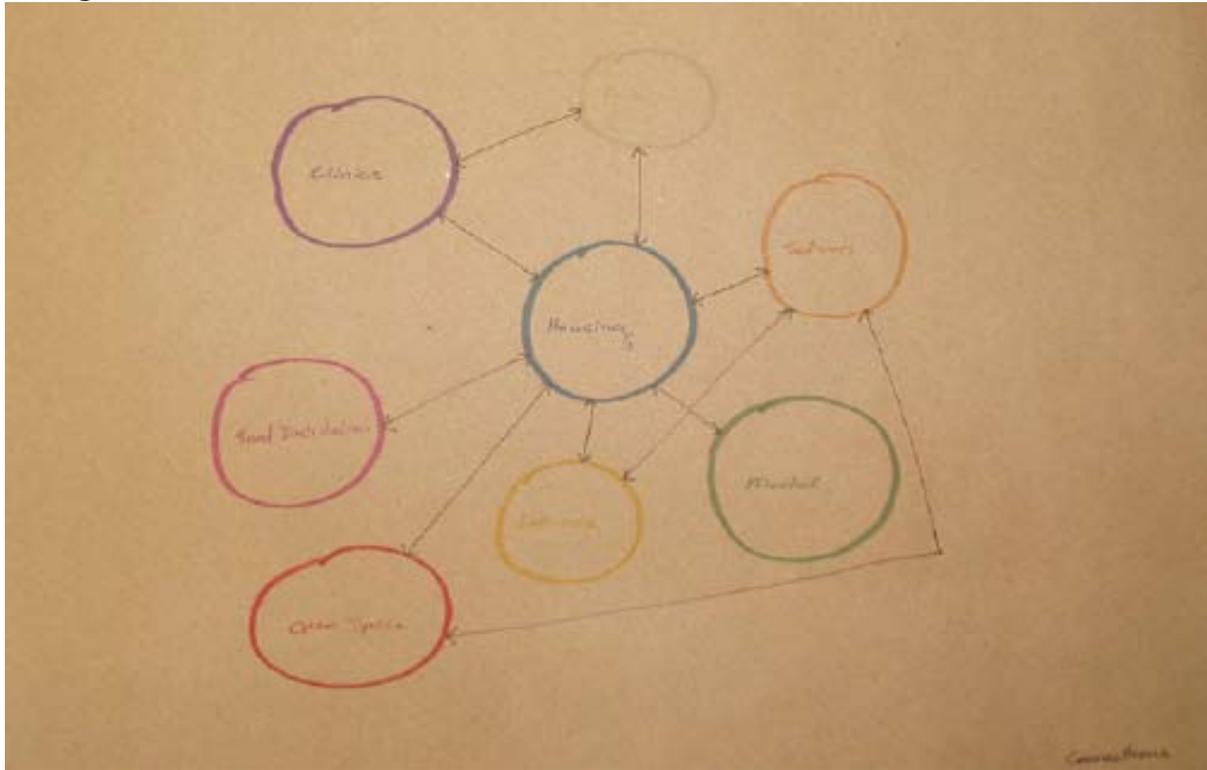
Key

	Agricultural Area
	Family Area
	Elderly Area
	Single Women Area
	Children Area
	Single Men Area
	Quarantine Area
	Hospital Area
	Entrance
	Major Roads
	Minor Roads and Pathways

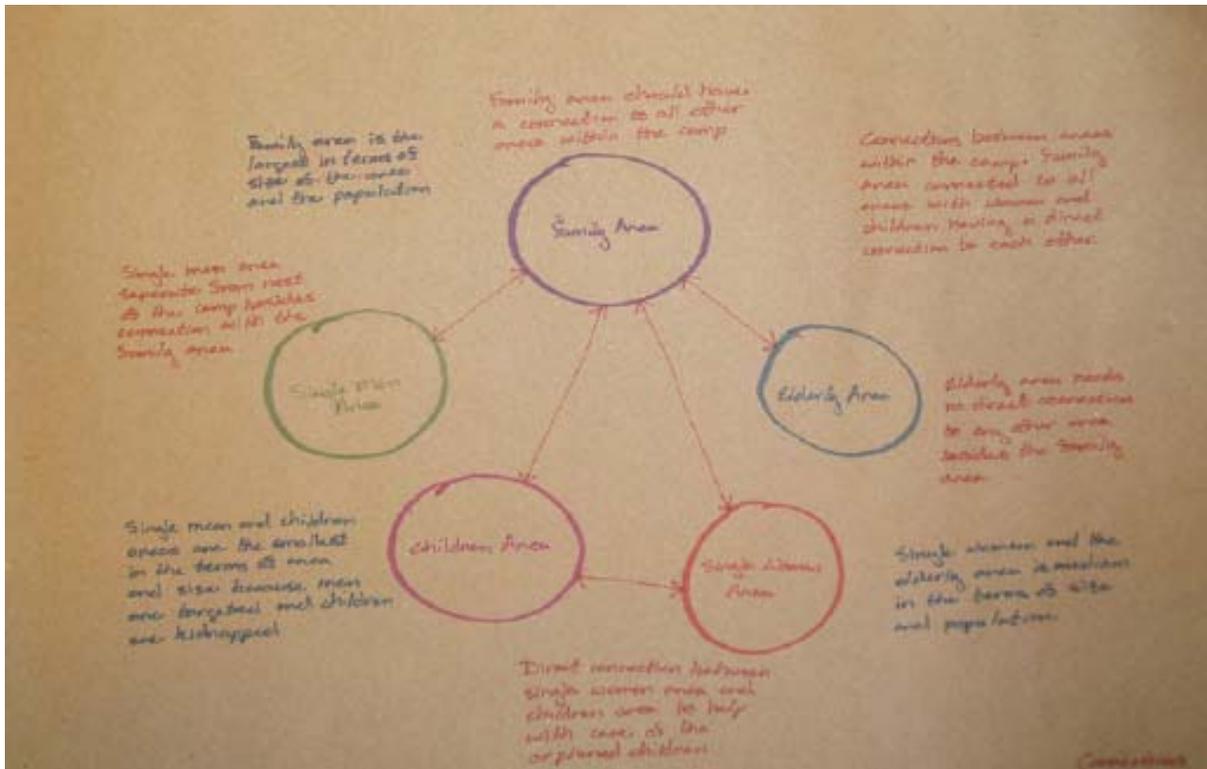
The diagrams show how the overall camp design has evolved and how the major sector areas connect and interact. The agricultural sector is used as a sector barrier into the camp and to direct incoming refugees towards the entrance. The family sector is located near the agricultural sector with the idea that the families will participate in most of the agricultural activities. The single men sector is located near the agricultural area for the same reason as the family sector, and the sector is located near the entrance so that administration can keep a closer eye on the single men since they are more likely to cause problems within the camp. The children sector is located near the entrance so aid workers are closer to the children and the sector is located next to the single women sector with the idea that the single women will help in the care of the orphaned children.

Sector Design

Diagrams

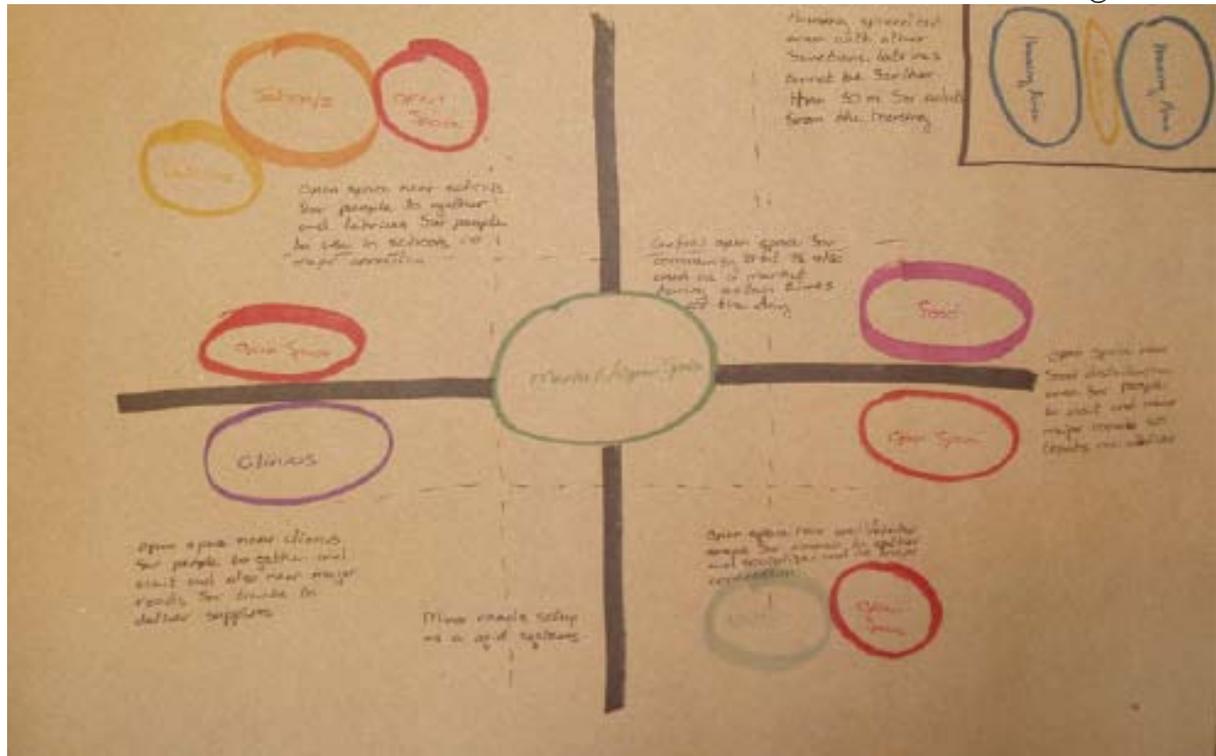


The diagram shows the direct connections of the sectors with each other within the camp.



The diagram shows the direct connections of the sectors with each other within the camp.

Sector Design Diagrams



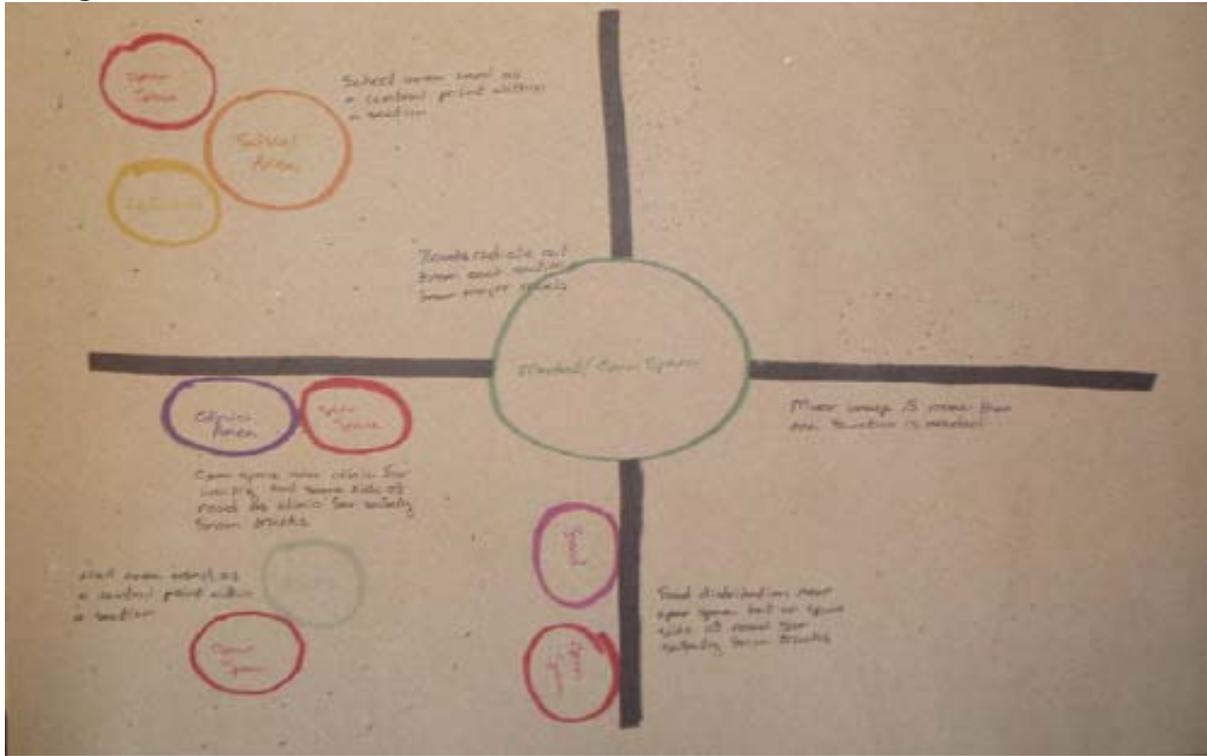
The diagram shows a possible layout and connections of the facilities within each of the sectors within the overall camp.



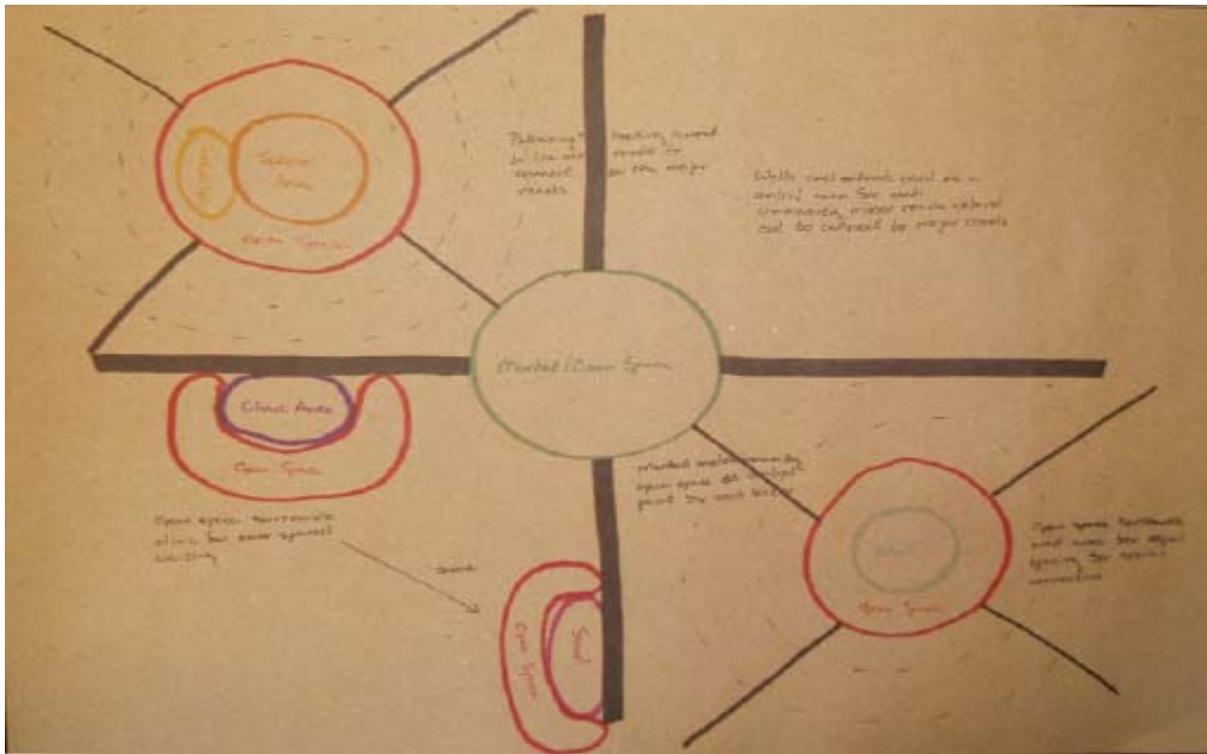
The diagram shows a possible layout and connections of the facilities within each of the sectors within the overall camp.

Sector Design

Diagrams



The diagram shows a possible layout and connections of the facilities within each of the sectors within the overall camp.



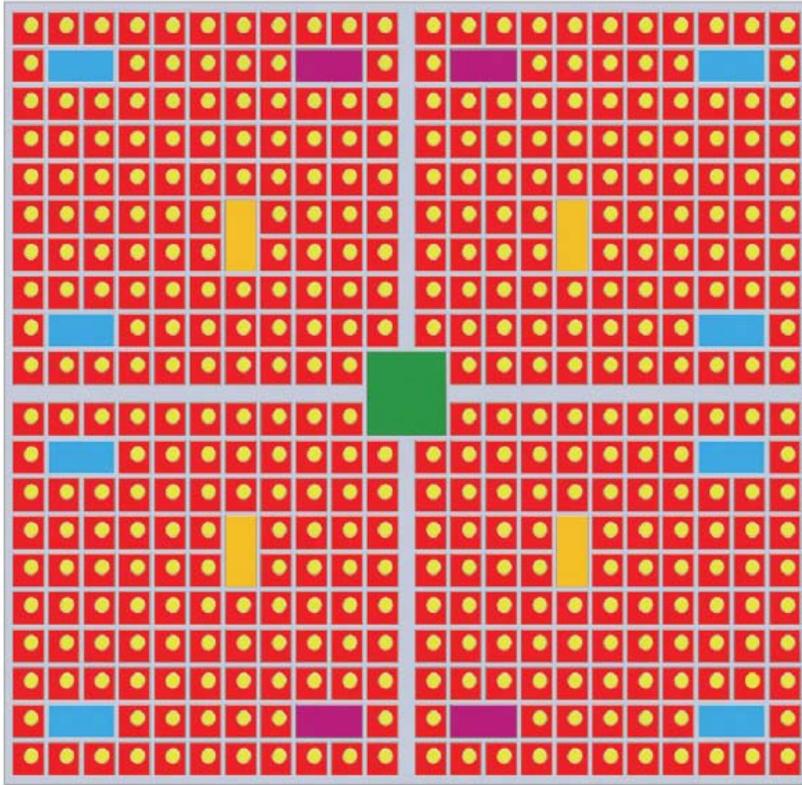
The diagram shows a possible layout and connections of the facilities within each of the sectors within the overall camp.

Sector Design

Diagrams

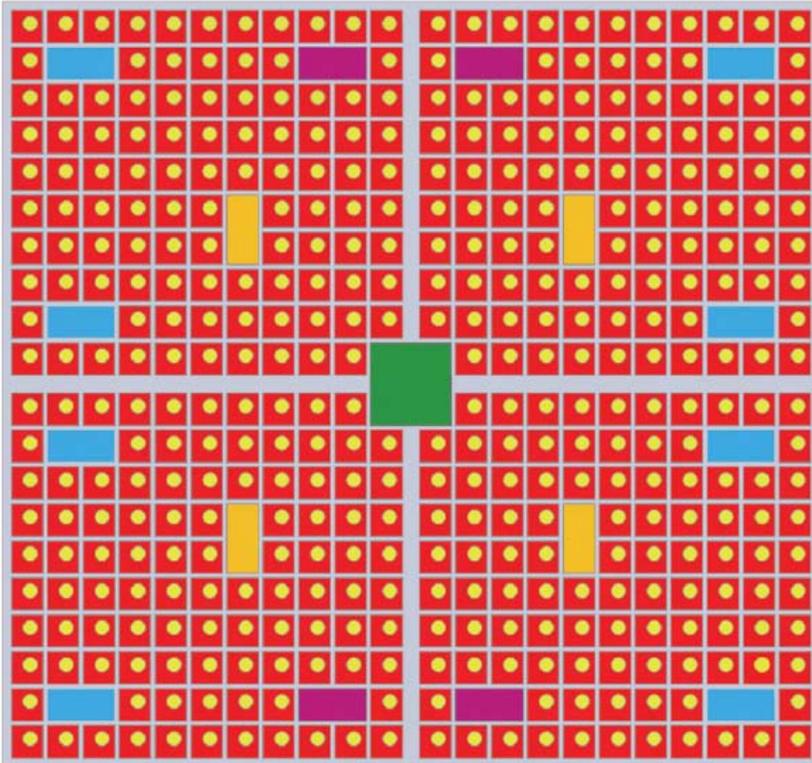
The diagrams shows the possible layouts and connections of the facilities within each of the sectors within the overall camp. The diagrams are to help figure how the major roads would be placed and how the facilities would interact with the roads, such as the clinics need access by truck to them for supplies. Besides the placement of the major roads the minor roads The diagrams help to decide where the open spaces should be around facilities such as the schools, clinics, and distributions areas besides the central community space in the center of each sector.

Sector Design



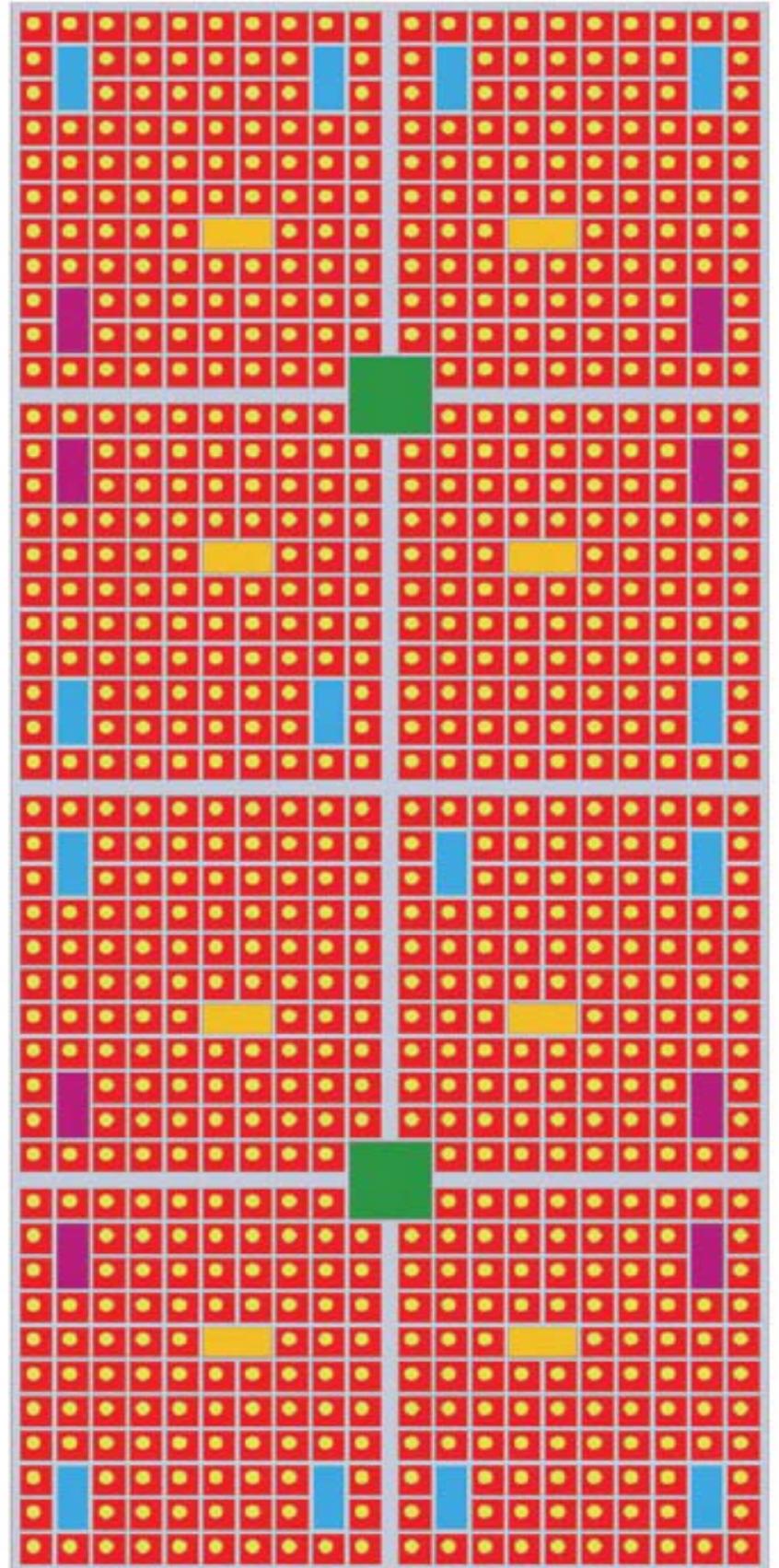
Key

- Housing Area
- Housing
- School Area
- Clinic Area
- Open Area
- Pathways Area
- Distribution Area



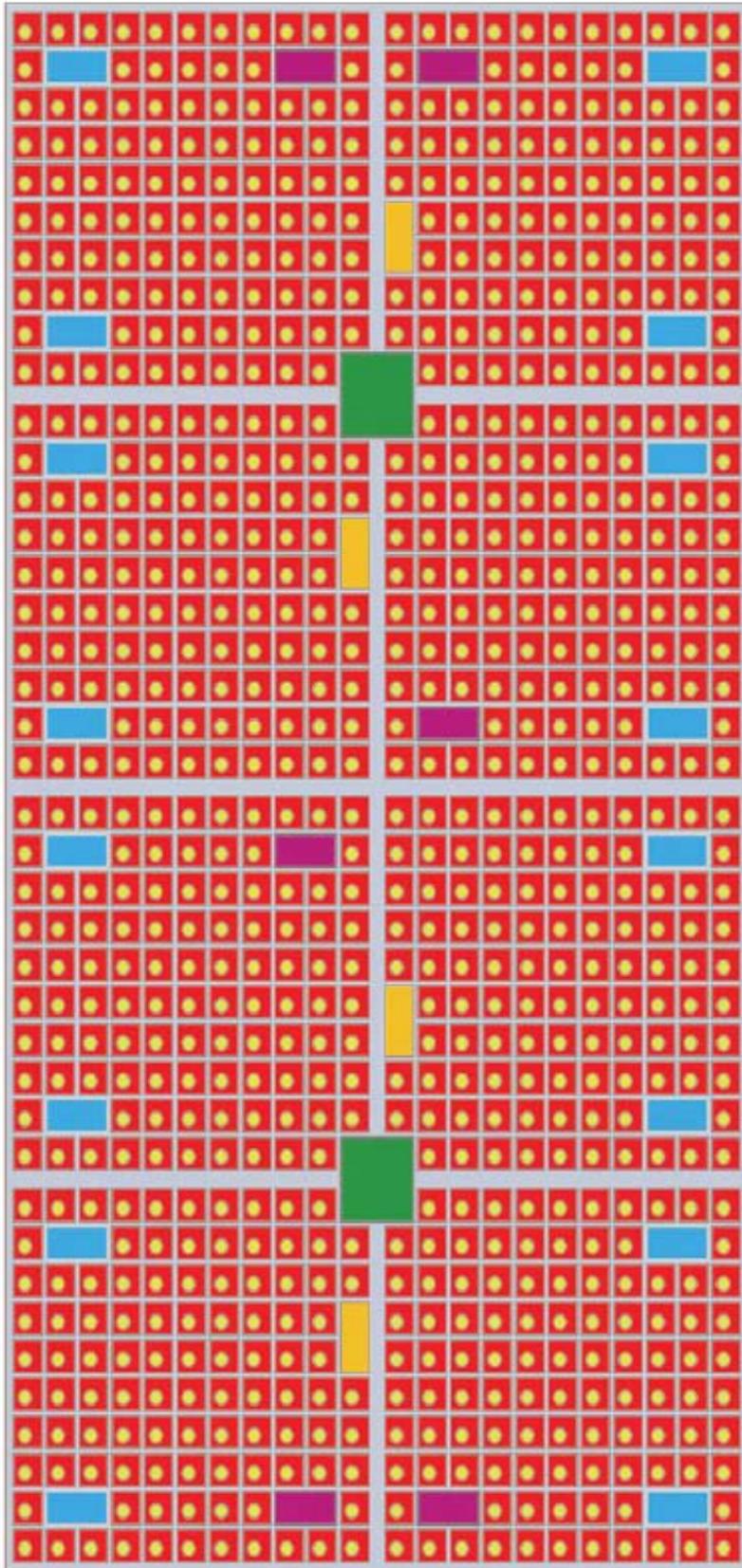
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Sector Design



Key

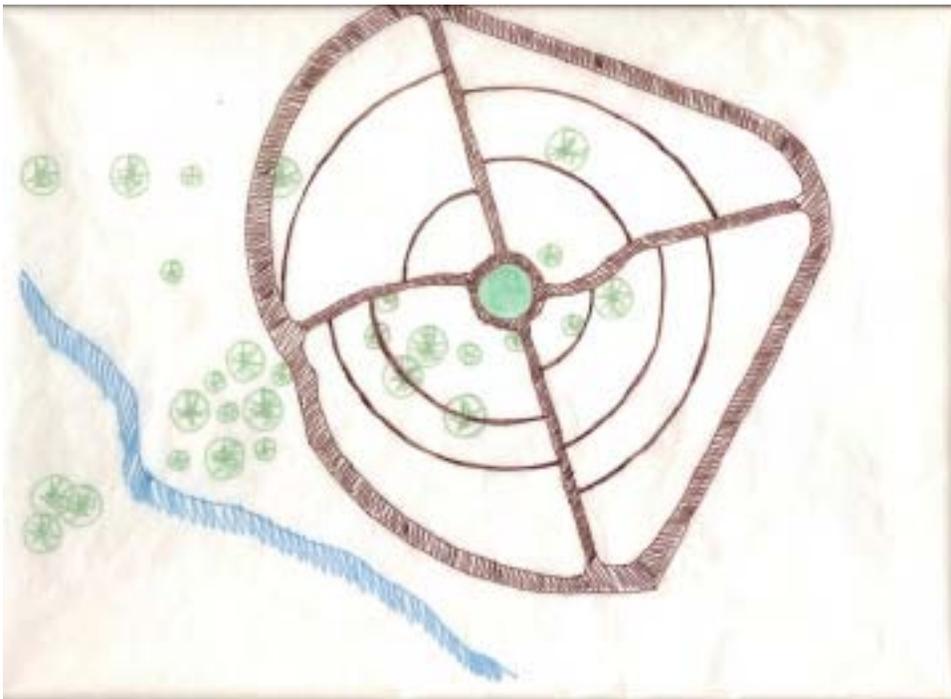
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- Distribution Area



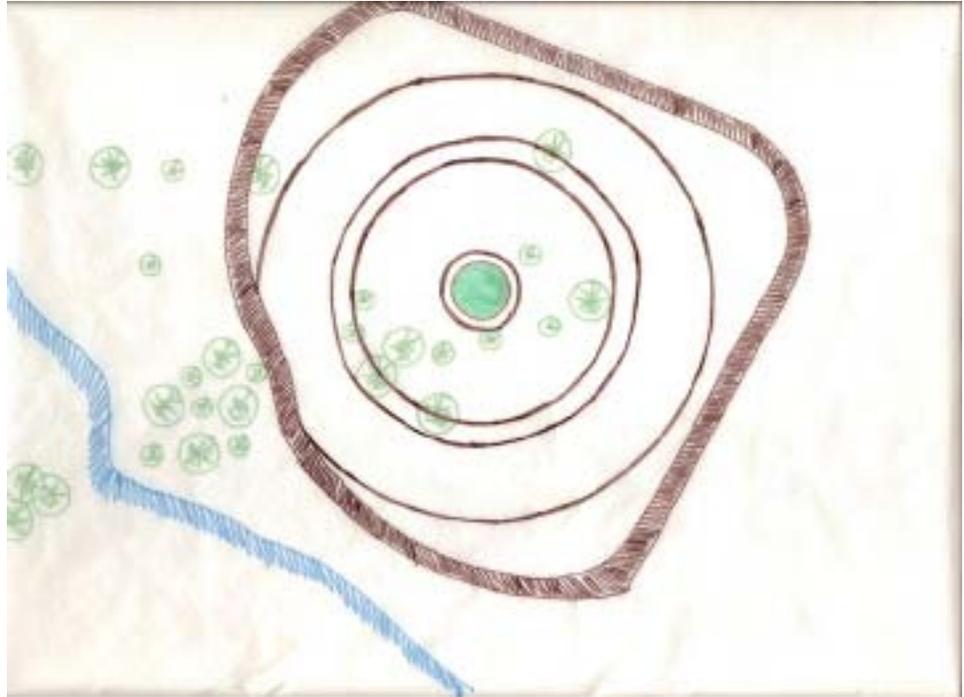
The different layouts for the sectors was not only to help determine the layout of the facilities within the sector but how the sector would be shaped and formed by the required space for the facilities based on the number of people that each sector would inhabit, but also how the roads and pathways would be designed to not only function in a productive way. The layout of the pathways and roads with the sector on how the design would also work aesthetically and help with the the layout of the facilities. To determine where facilities would be place would be determined by the pathways and roads but also where the facilities would be built in order to setup a system to build the camp.



Sector Design

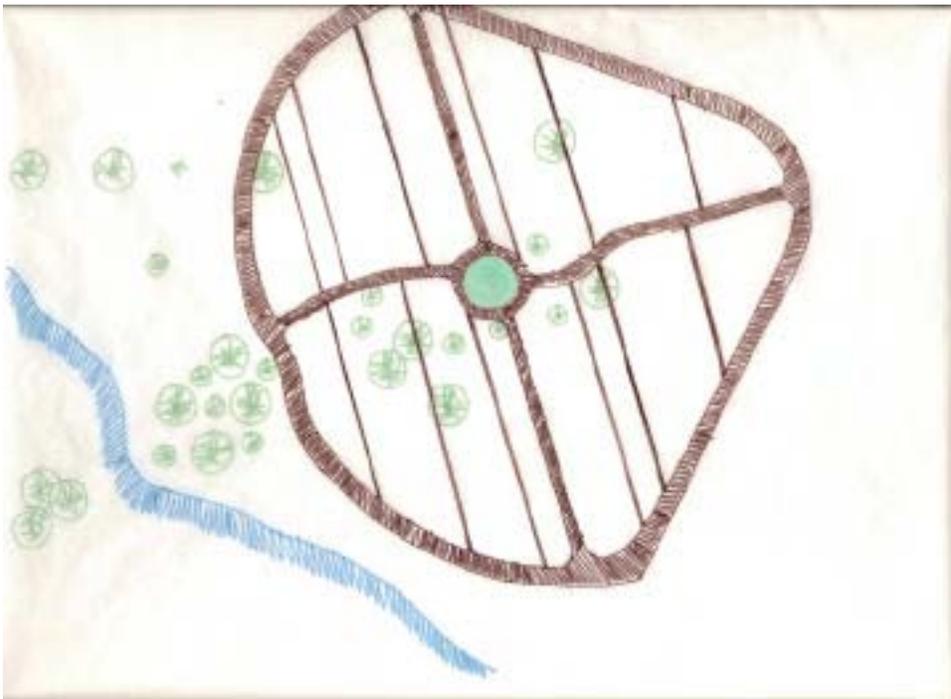
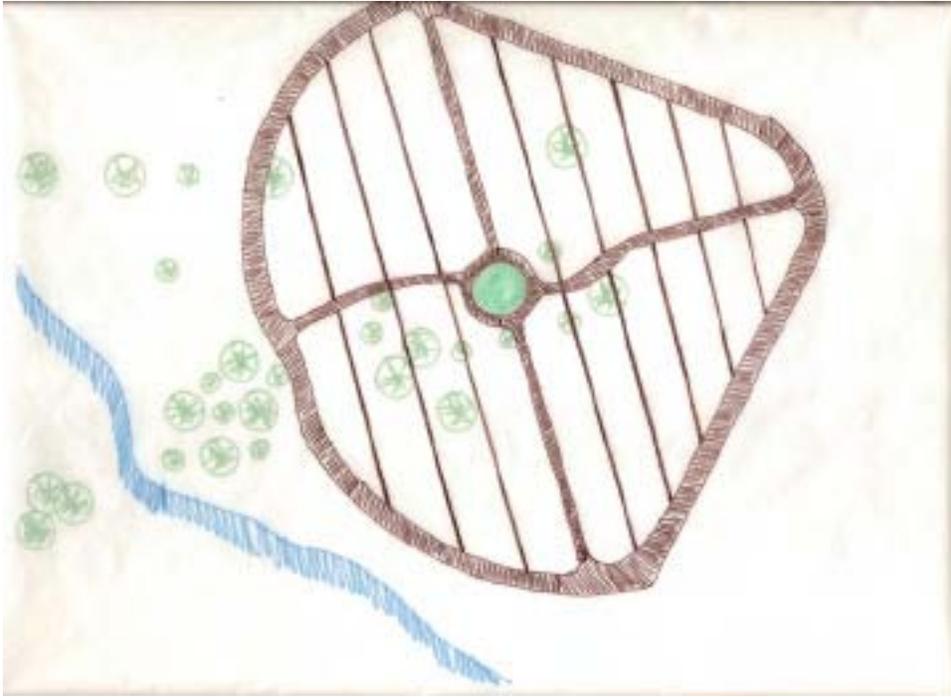


The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have two axis of major roads connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has the circles radiate at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.

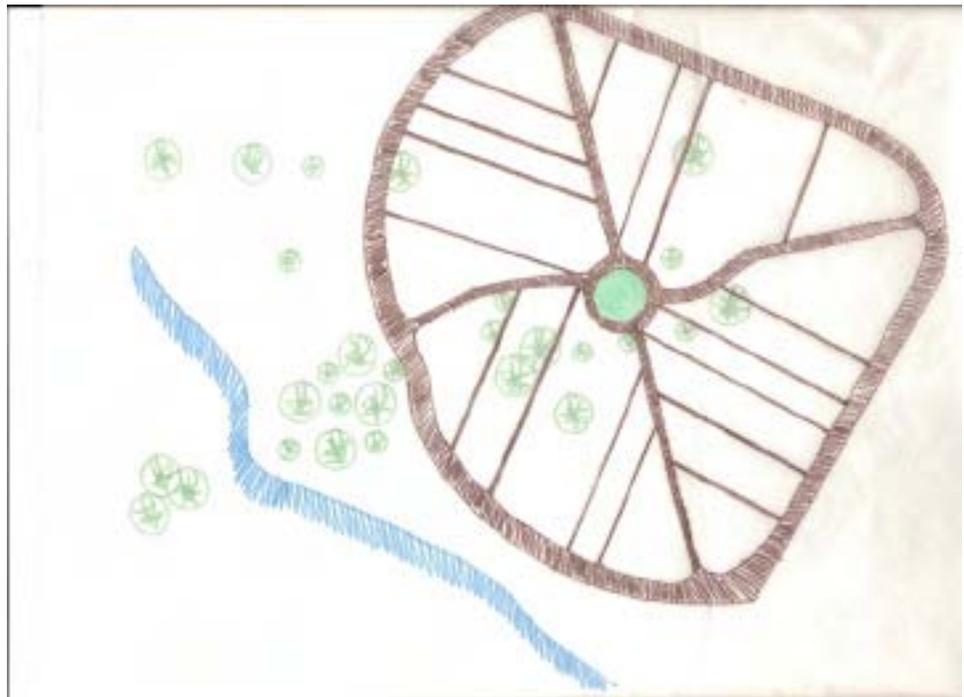
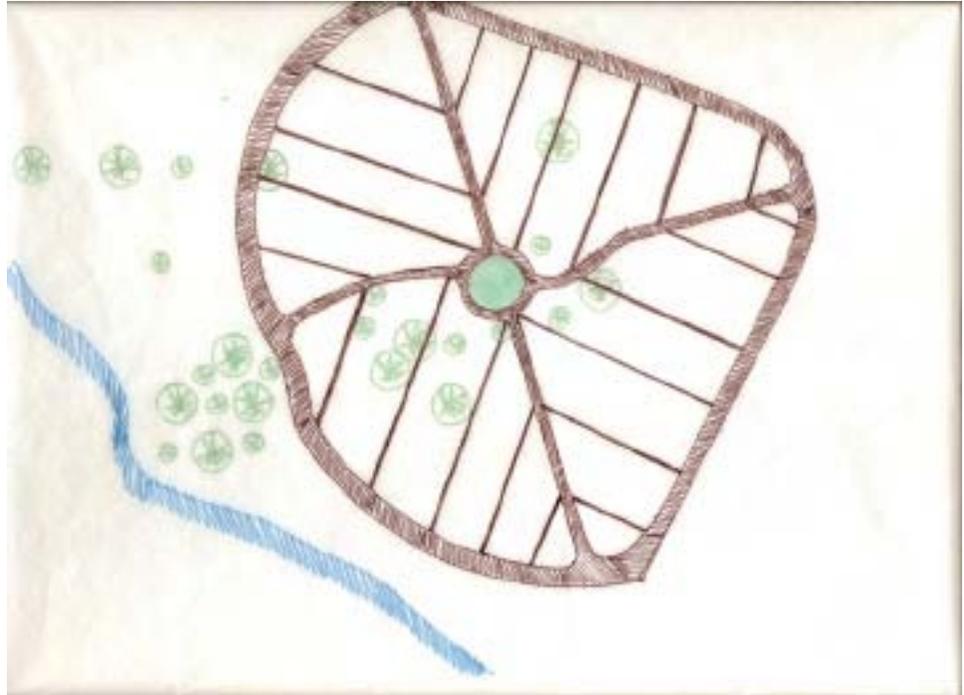


The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have one of major road connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has the circles radiate at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.

Sector Design

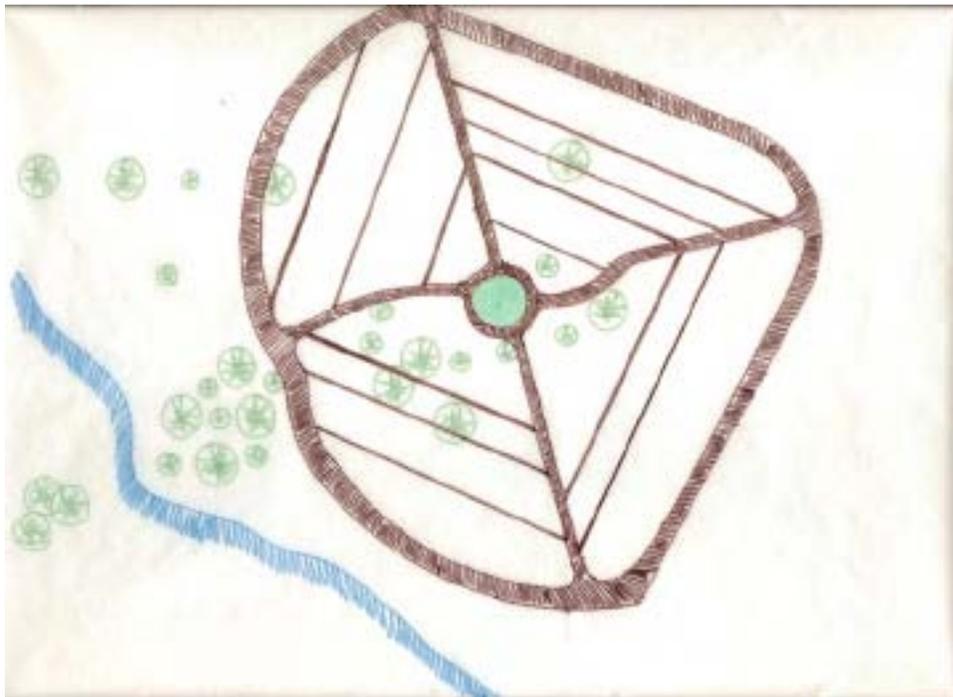
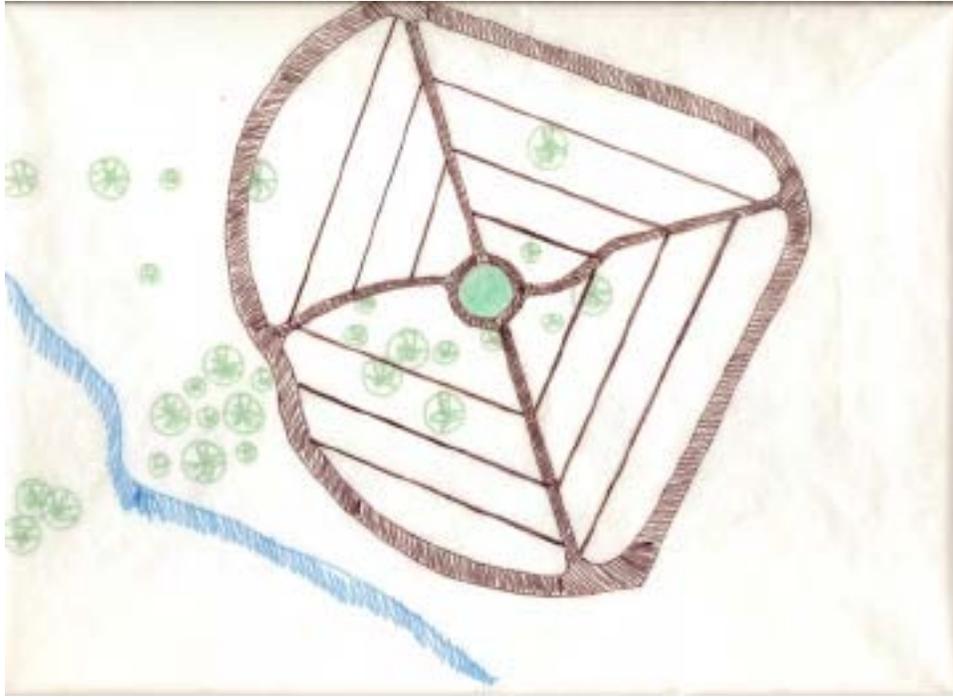


The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have two axis of major roads connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has pathways that are parallel to one of the major axis roads at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.

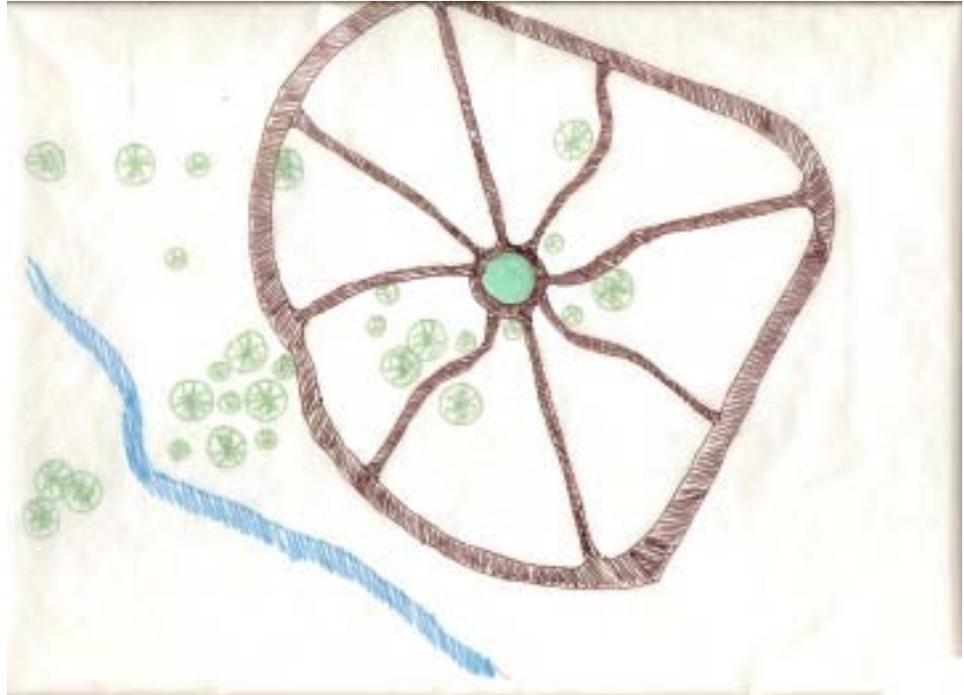


The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have two axis of major roads connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has pathways that are diagonal to the major axis roads at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.

Sector Design

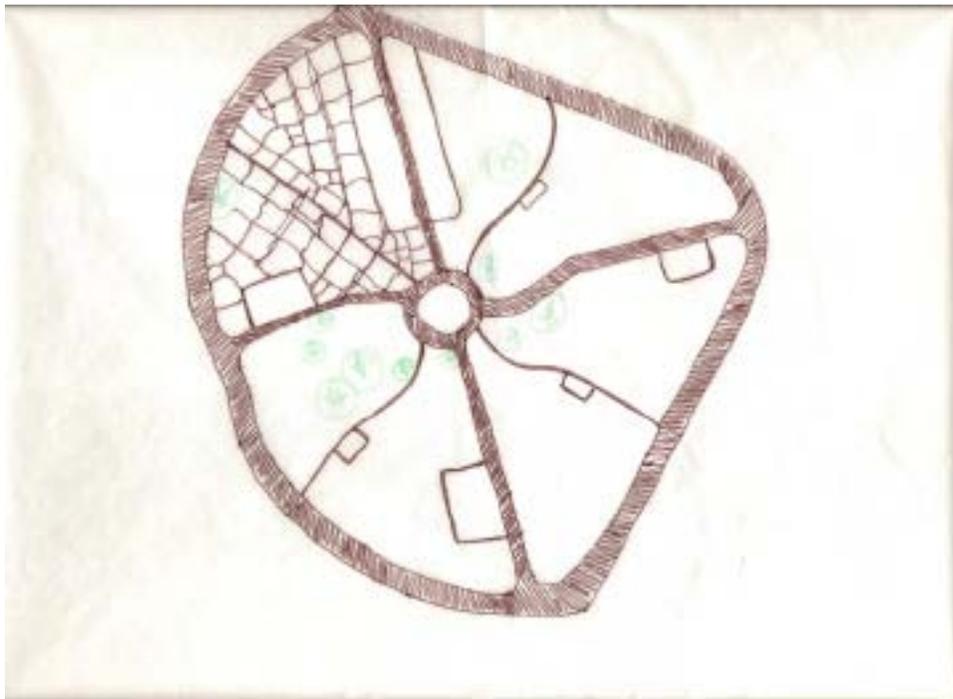
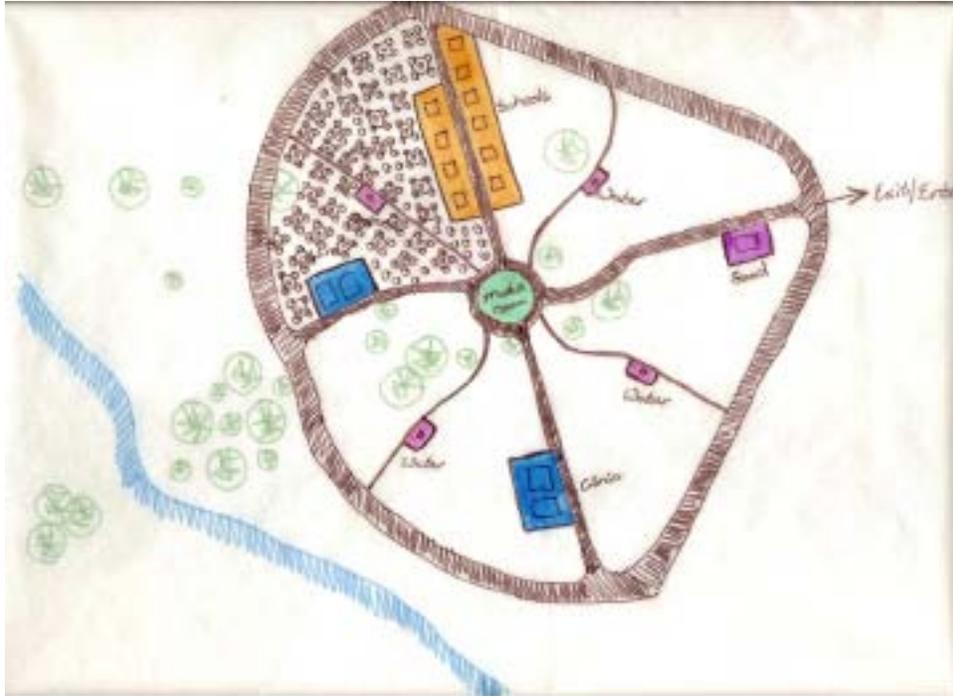


The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have two axis of major roads connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has pathways that are diagonal to the major axis roads at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.



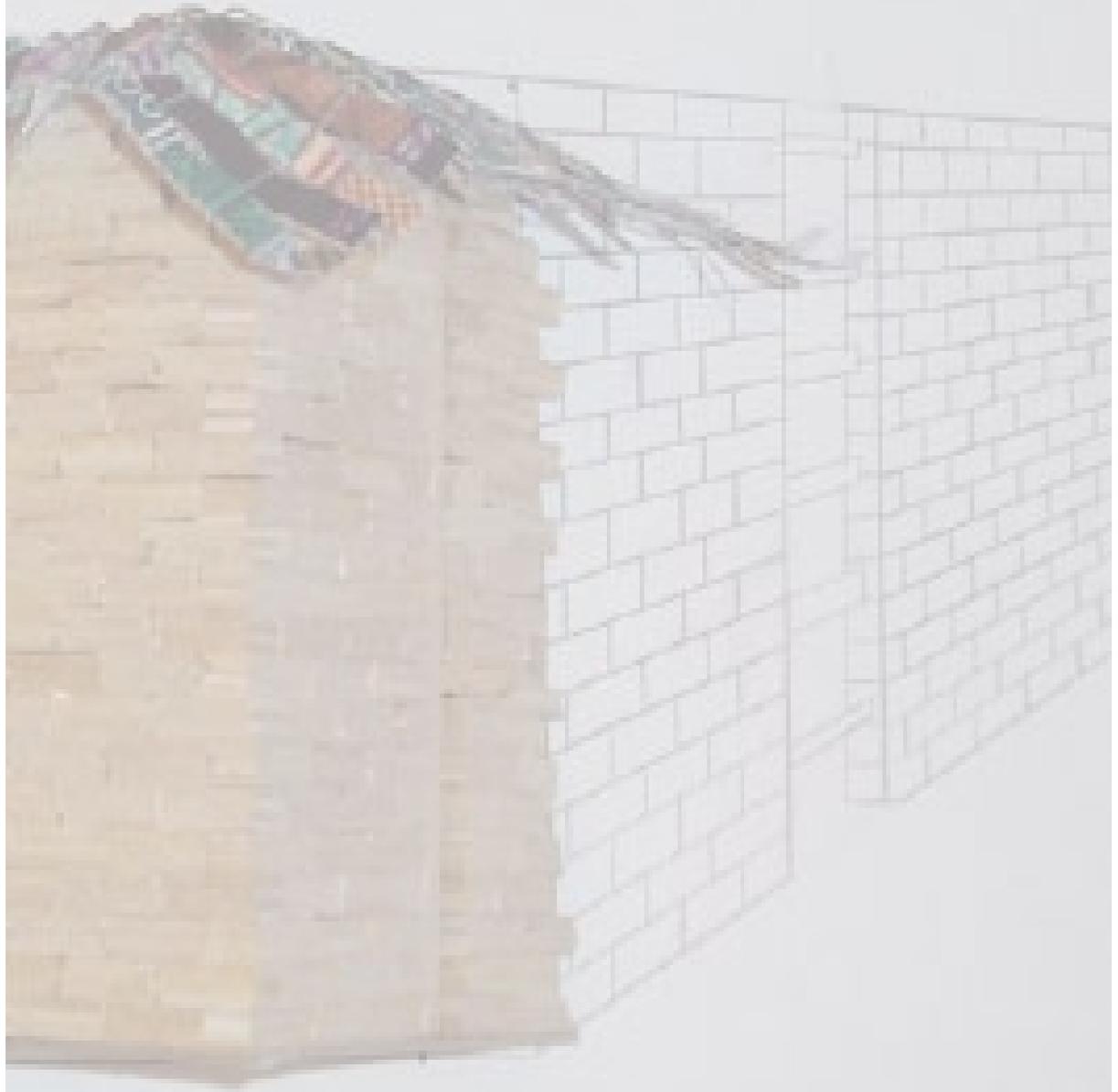
The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have one of major road connecting to the community open space in the center with the minor pathways that radiate from the center. The first drawing has the pathways that radiate from the center in a star pattern at an even dimension with the second would be based on what activity would be in the area in between the pathways determining the dimensions.

Sector Design



The drawings are an exploration on the layout of the major roads and pathways within each sector. The two drawings above have one of major road connecting to the community open space in the center with the minor pathways that radiate from the center. The drawings has the pathways that radiate from the center in a star pattern at an even dimension with the areas in between are defined in a grid pattern to determine where facilities would be built.

Building Design





235 Housing Design

251 School Design

261 Clinic Design

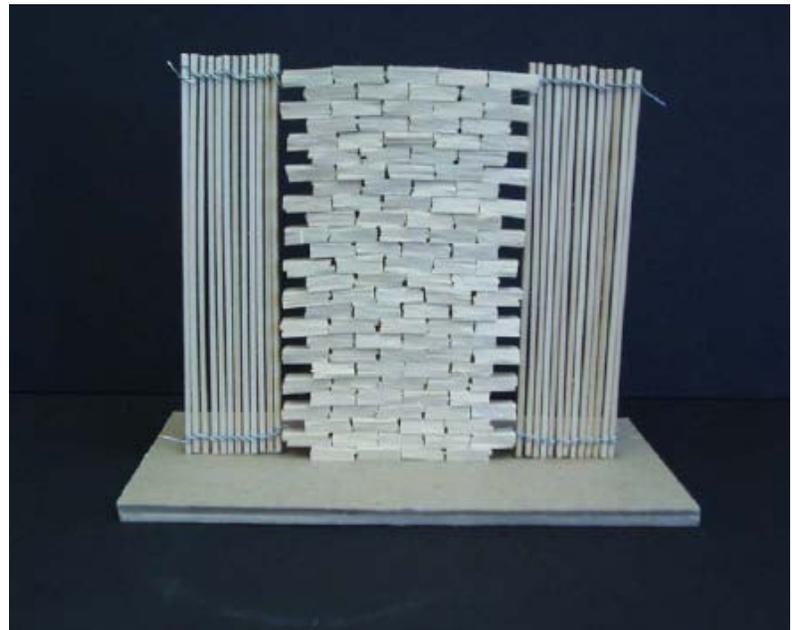
Housing Design



Housing Design

Wall Studies

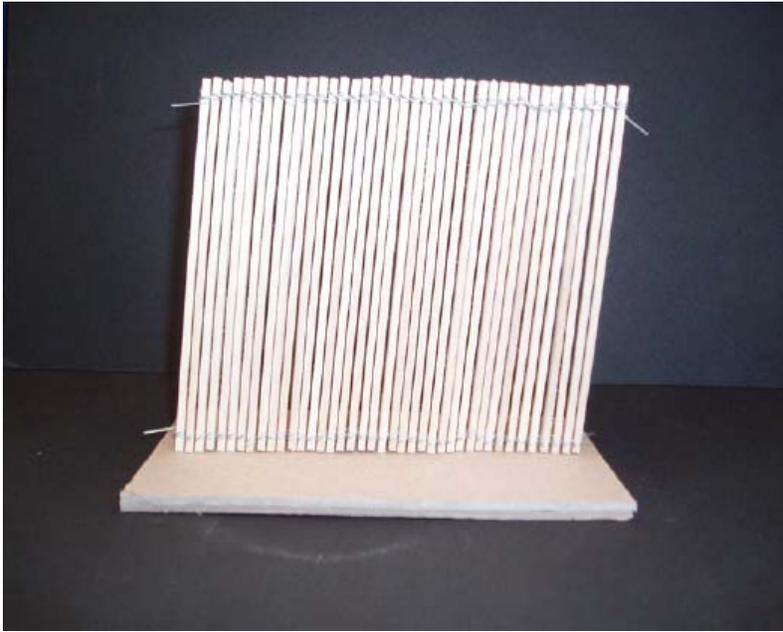
The models in the next few pages are studies on different wall configurations consisting of the use of bamboo and straw bricks in different forms and patterns. The models also serve as studies into possible design solutions for the housing structures.



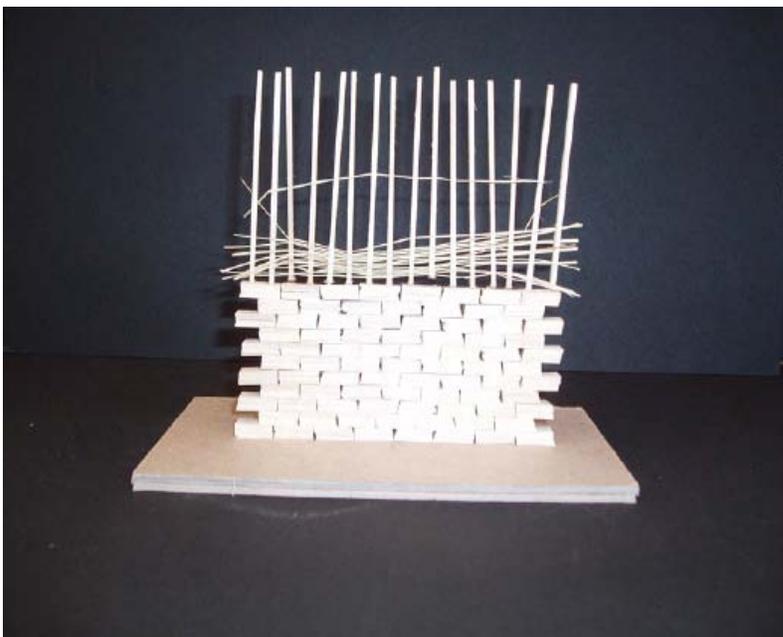
The images above of a scaled model shows one possible was solution of bamboo for a solid wall with no openings such as a doorway or window.

Housing Design

Wall Studies

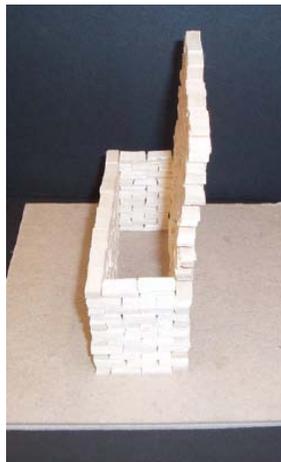


The images above of a scaled model shows one combination of bamboo and straw bricks to create a possible wall design for a solid wall with no openings such as a doorway or window. The images below show another combination of bamboo and straw bricks with the use of thatching that is weaved in between the bamboo also for a solid wall with no openings.



Housing Design

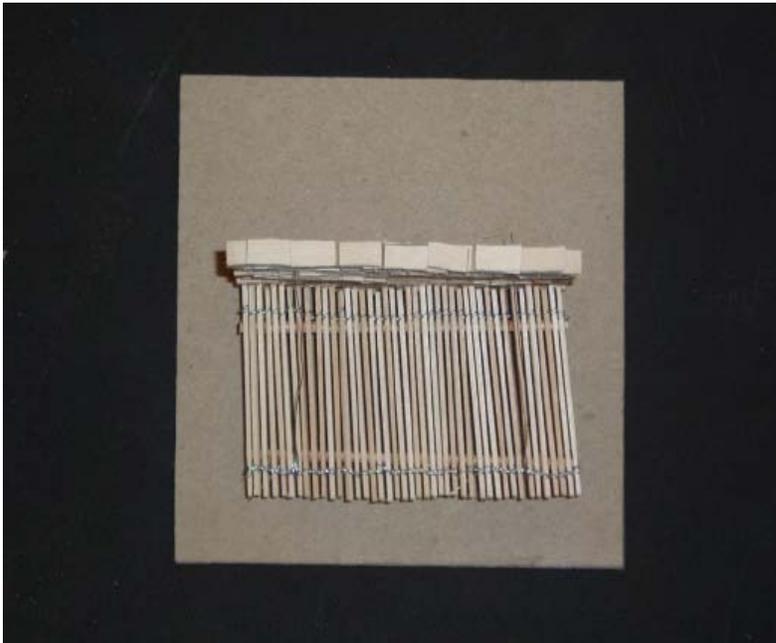
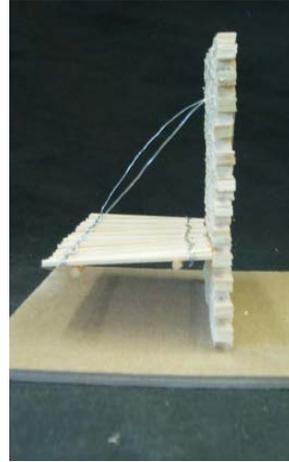
Wall Studies



The images above of a scaled model show a wall constructed of straw bricks to create a design for a solid wall with no openings such as a doorway or window. The wall serves to create a bench or bed that would be used for storage and the covering would be made of bamboo woven together with thatch.

Housing Design

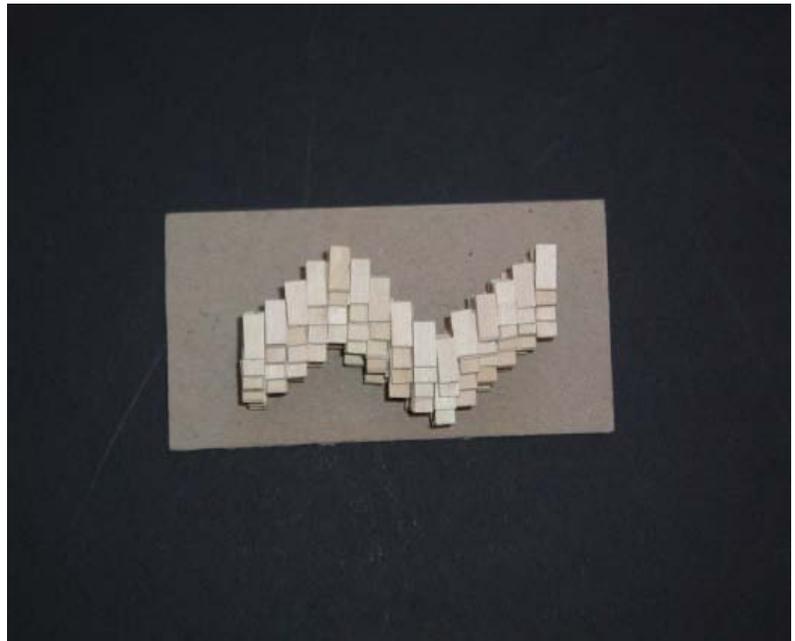
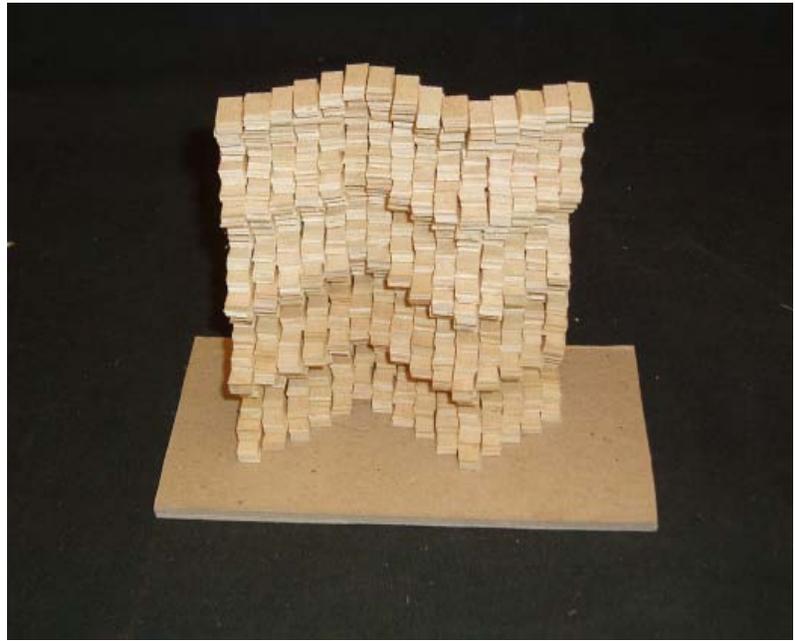
Wall Studies



The images above of a scaled model show a wall constructed of straw bricks to create a design for a solid wall with no openings such as a doorway or window. The wall serves to create a bed that would fold down and be hung from the wall when in use and would fold up to attach to the wall when the bed is not needed. The bed would be made of bamboo woven together with thatch.

Housing Design

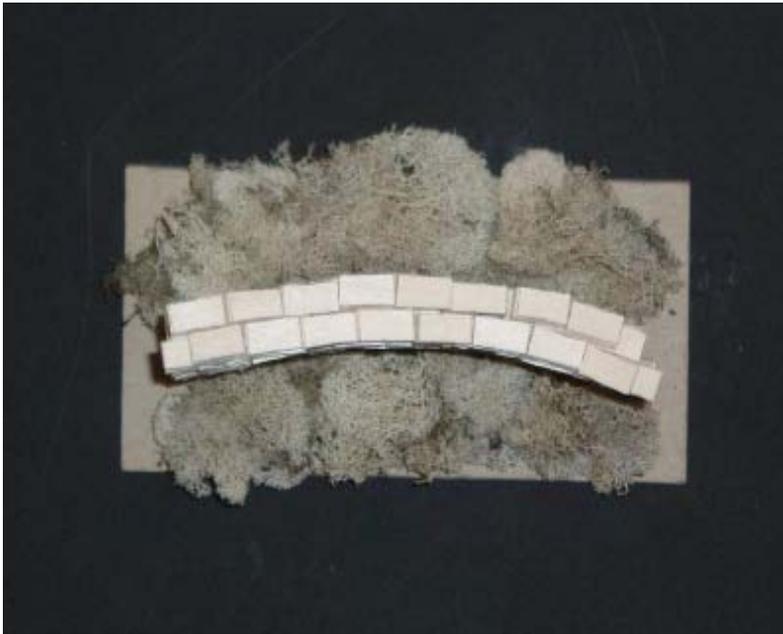
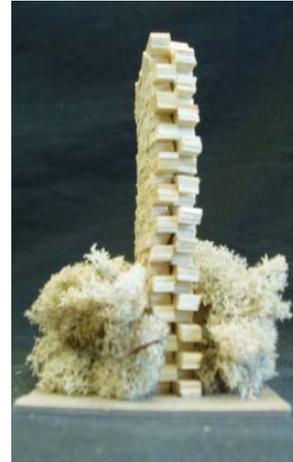
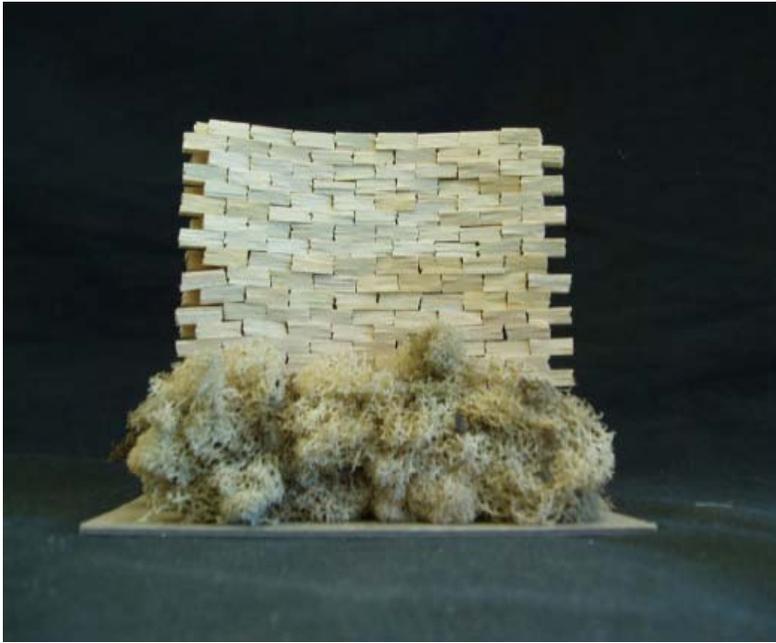
Wall Studies



The images above of a scaled model show a wall constructed of straw bricks to create a design for a solid wall with no openings such as a doorway or window. The wall shows how a wall would look if it curved in two directions, vertically and horizontally.

Housing Design

Wall Studies



The images above of a scaled model show a wall constructed of straw bricks to create a design for a solid wall with no openings such as a doorway or window. The wall serves as a security wall for an exterior and interior security wall. On either side of the wall would be African thorn bushes that act as a barbed wire fence to protect the people of the camp.

Housing Design Sketches



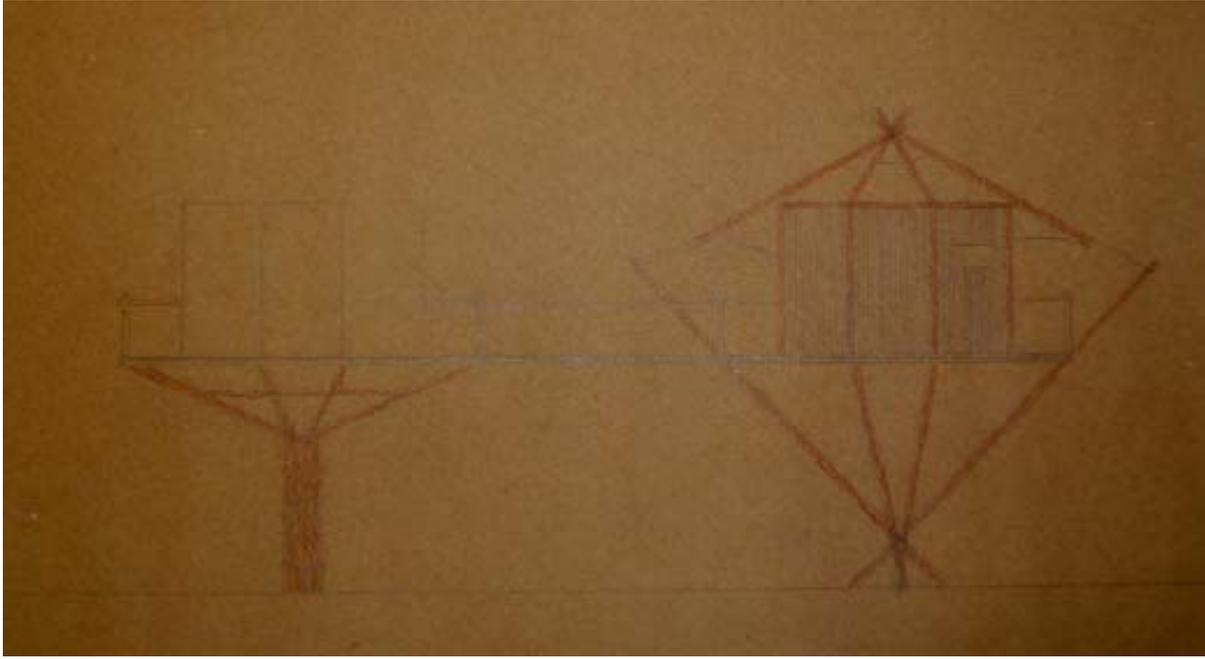
The sketch above is of a single family house that would be constructed of mostly bamboo with a fire pit in the center.



The sketch above is of a single family house that would be constructed of bamboo with and straw bricks with the use of the storage bed areas, and a fire pit in the center.

Housing Design

Sketches



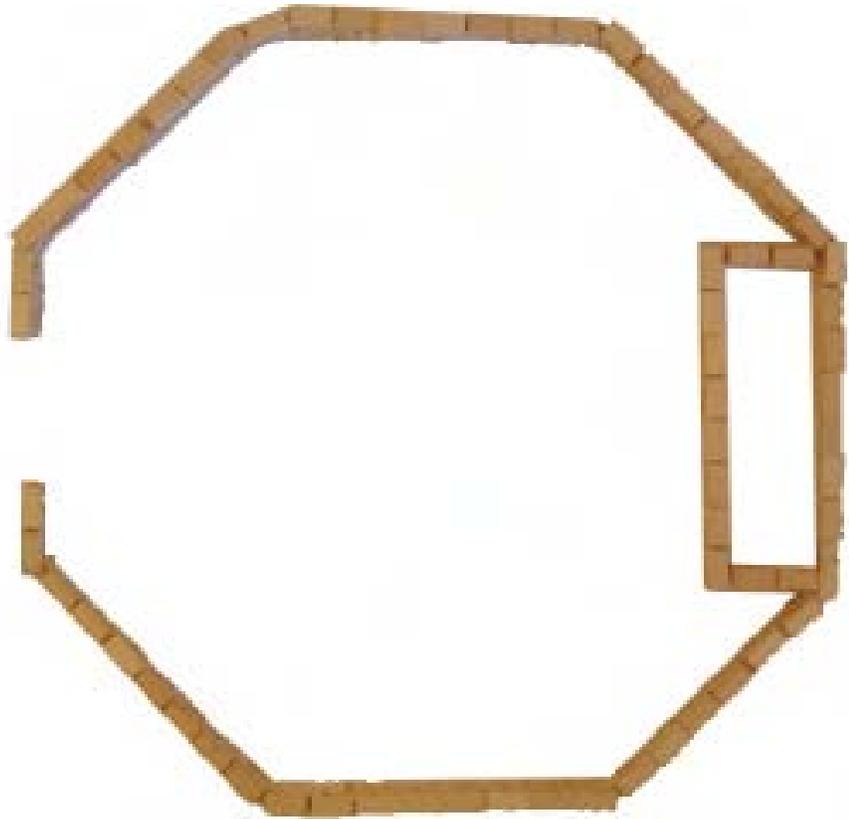
The sketch above is of the group family house that would be constructed bamboo with thatch weaved in between the bamboo.



The sketch above is of a kitchen for the group family housing that would be constructed of mostly straw bricks and some bamboo. The kitchen uses the storage bench area with a fire pit in the center.

Housing Design

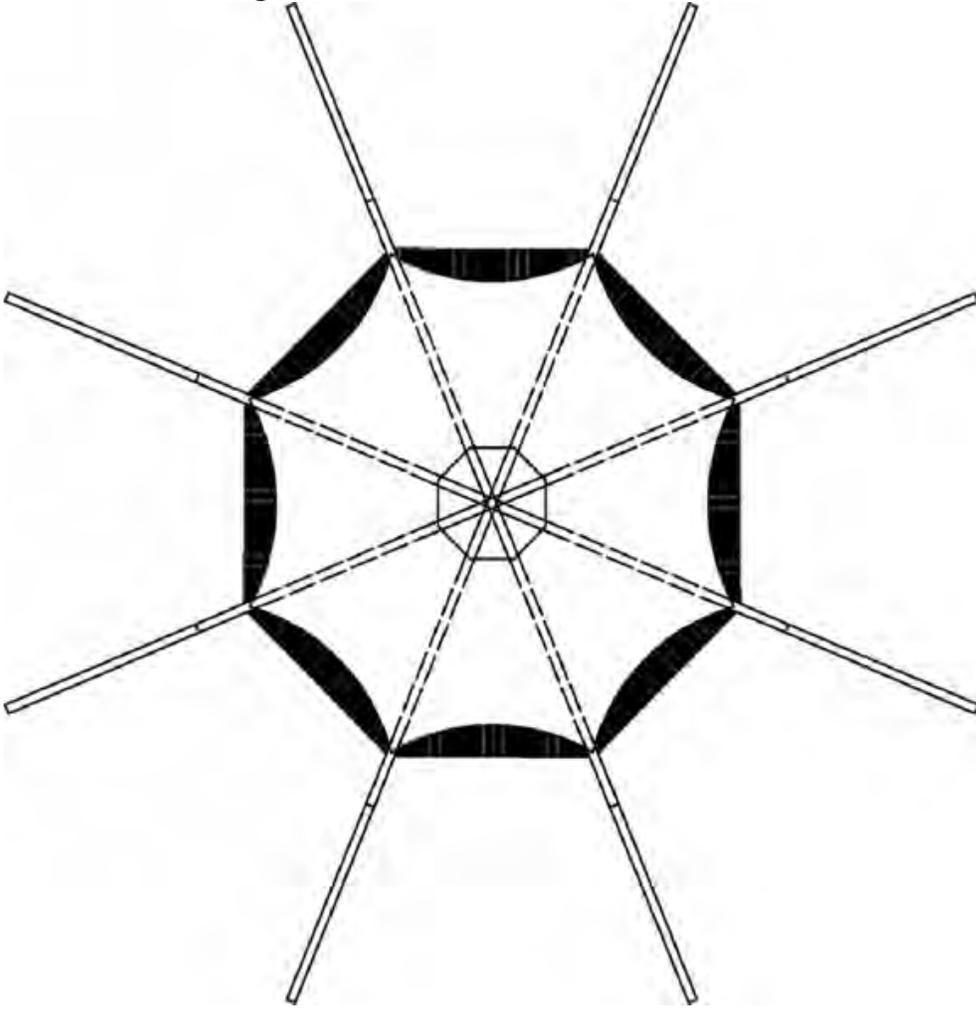
Schematic Design



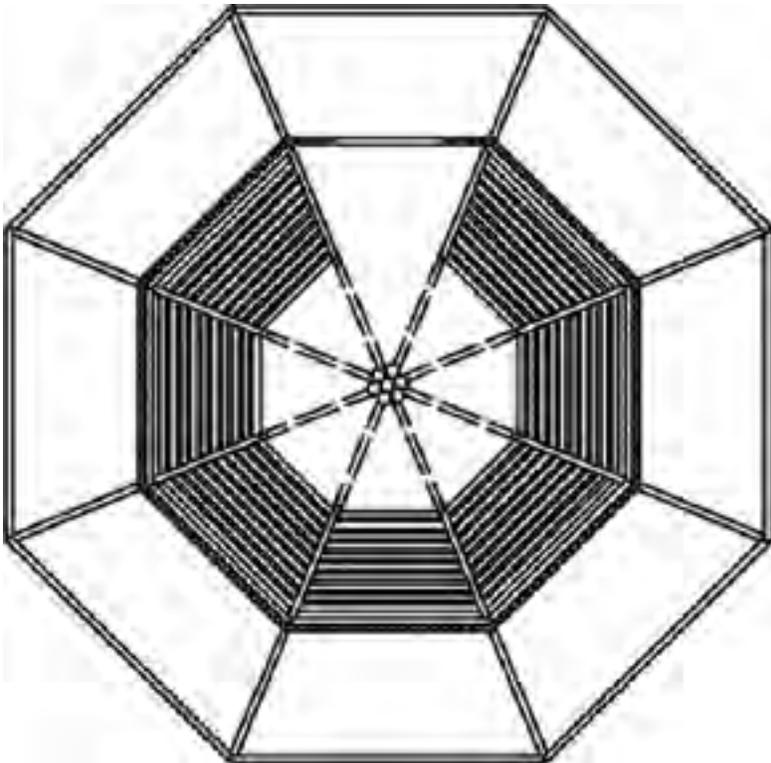
The model above is one proposed design solution for the single group housing with the storage bench design and a fire pit in the center.

Housing Design

Schematic Design



Roof plan.

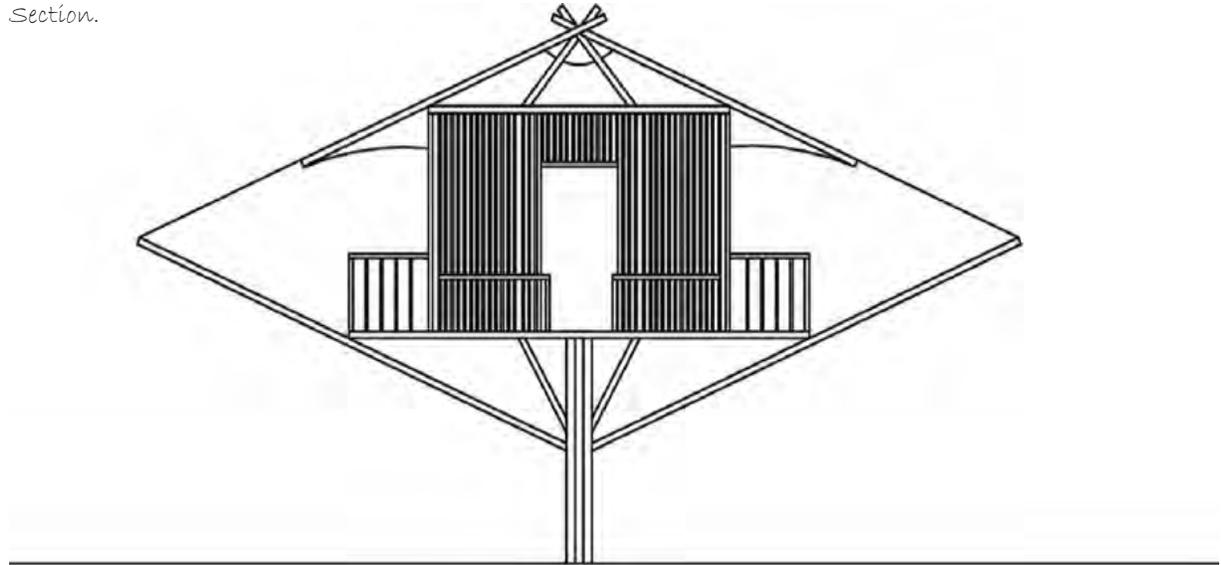


Floor plan.

Housing Design

Schematic Design

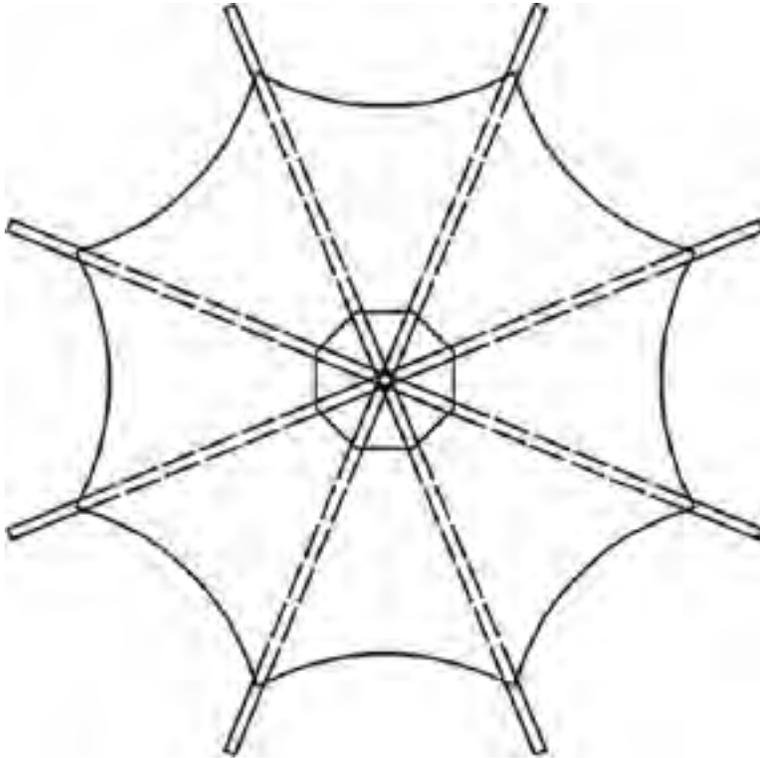
Section.



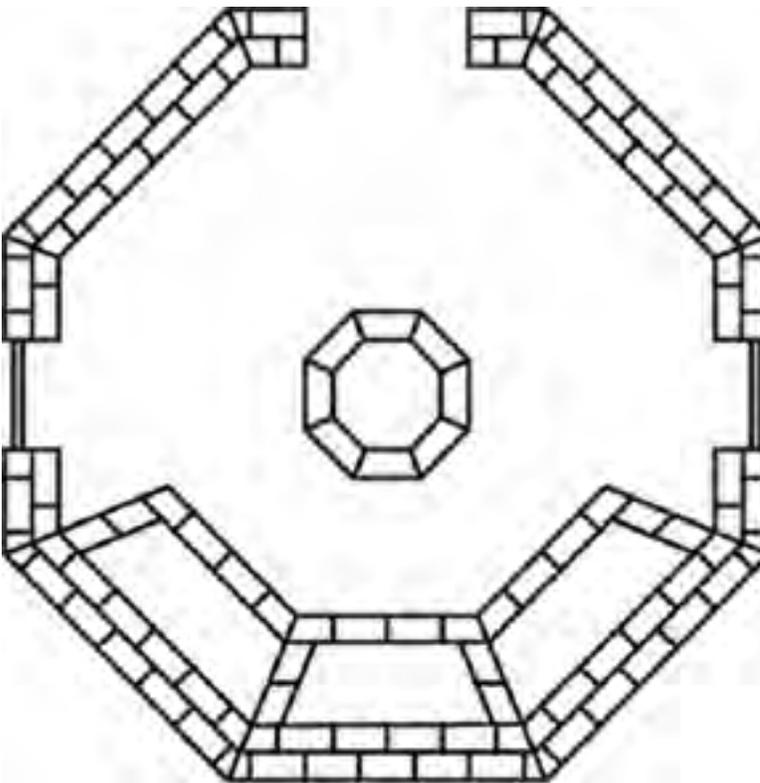
The computer drawing illustrate the roof plan, floor plan, and section of one of the four housing units that would create the group family housing. The four units would be connected with walkways connecting the units together above the ground. The unites would be raised off the ground to not only provide shelter from the sun but would create more ground space for the people to work. In the center of the four units would be a central kitchen on the ground. The kitchen would serve all four units to minimized the need for a fir pit and reduce the risk of fire.

Housing Design

Schematic Design



Roof plan.

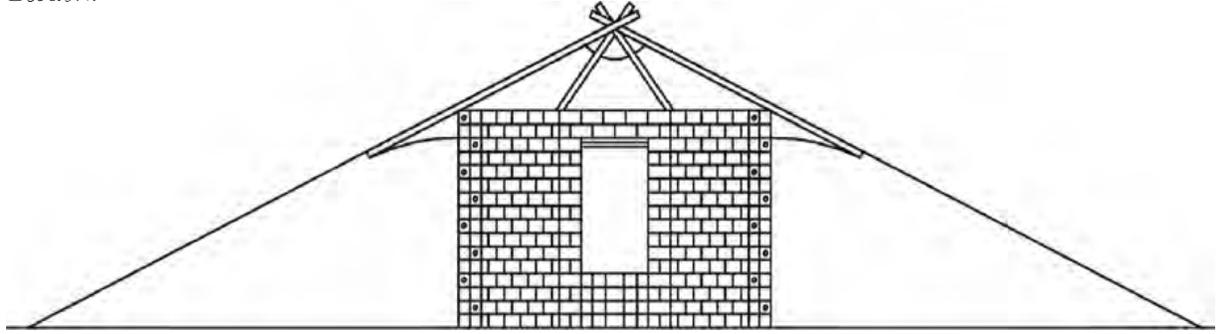


Floor plan.

Housing Design

Schematic Design

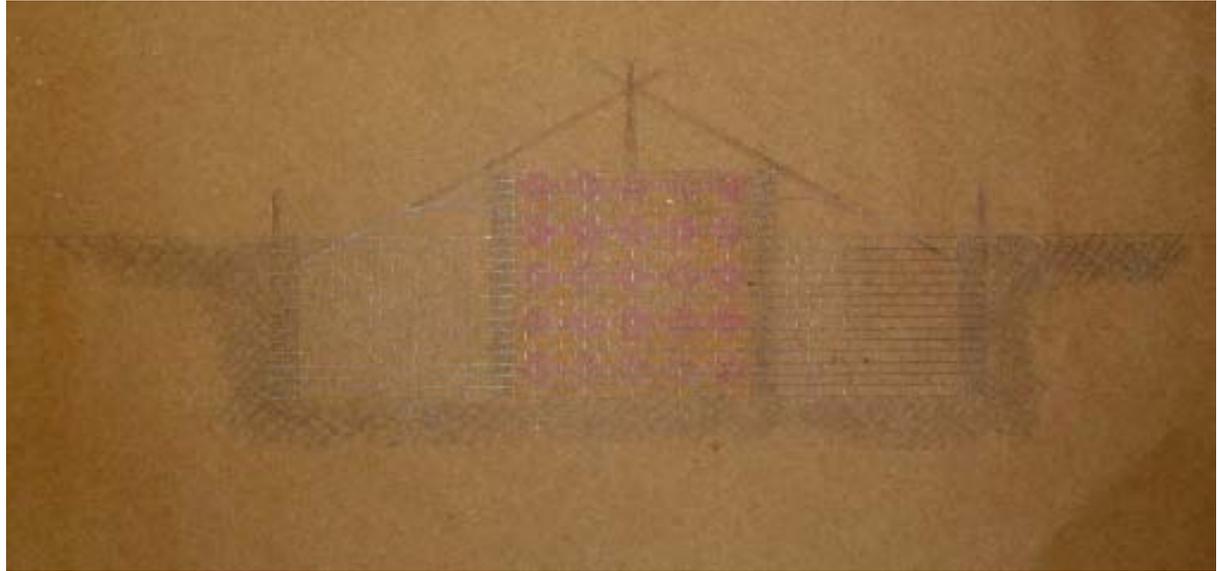
Section.



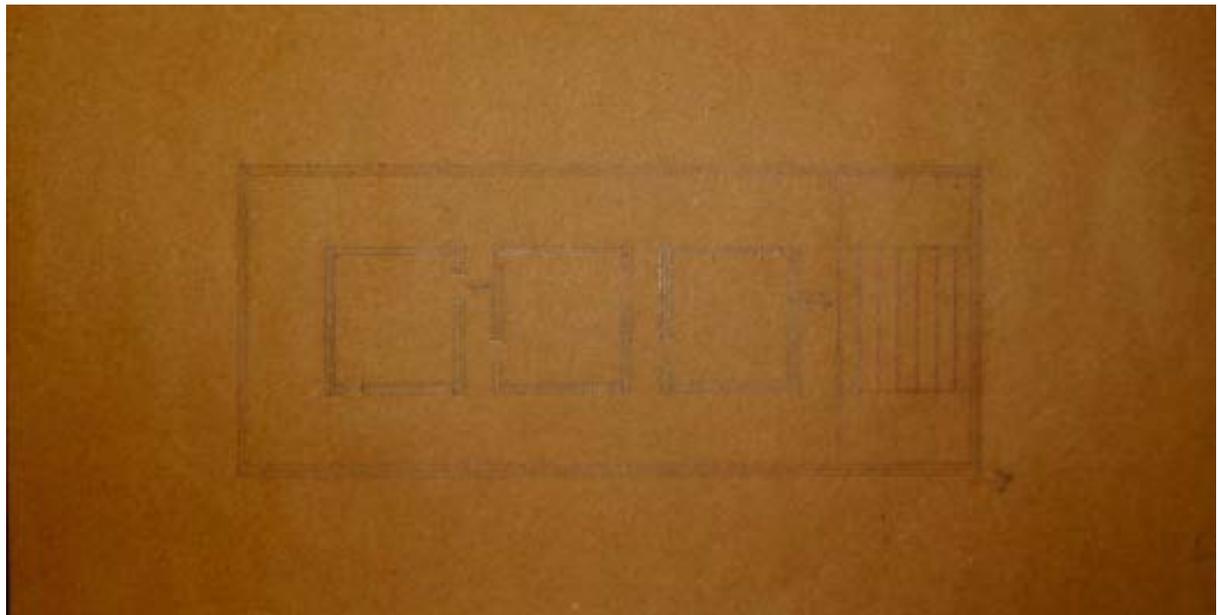
The computer drawing illustrate the roof plan, floor plan, and section of the kitchen design that would be in the center of the group family housing. The kitchen would serve all four units to minimized the need for a fir pit and reduce the risk of fire. The kitchen design would also include the storage bench area for food, cooking supplies, water, and wood storage.

School Design





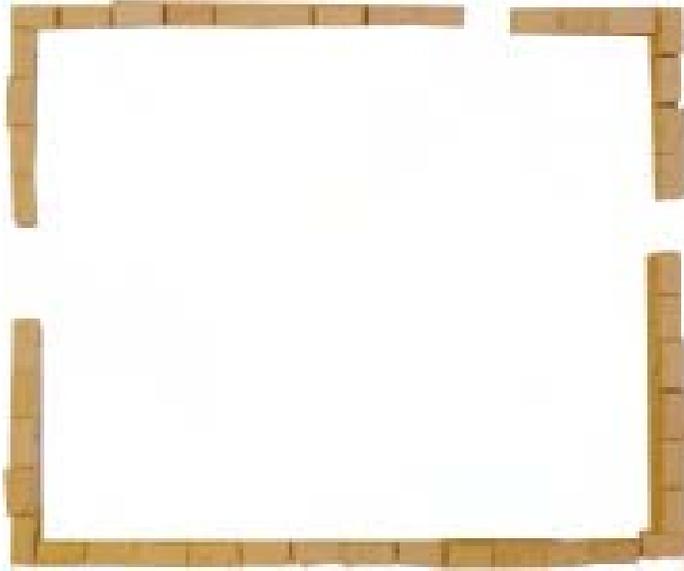
A sketch illustrates a section through the school. The schools would consist of multiple single classroom buildings. The classrooms would be dug into the ground to provide a cooler environment for the people to learn in.



The sketch illustrates the floor plan for the school. The school would be constructed mostly of straw bricks to keep the temperatures cooler with bamboo and thatch for the roof. There would also be exterior space for an outdoor classroom or gathering space that would have the goat hair fabric that would attach to the building to shade the area as needed

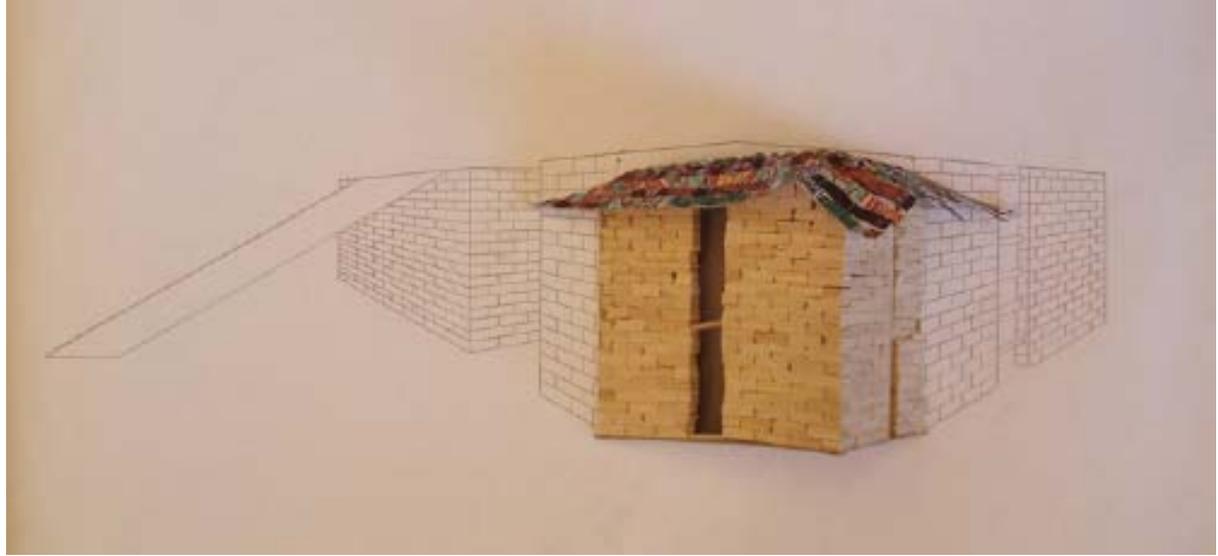
School Design

Schematic Design



School Design

Schematic Design

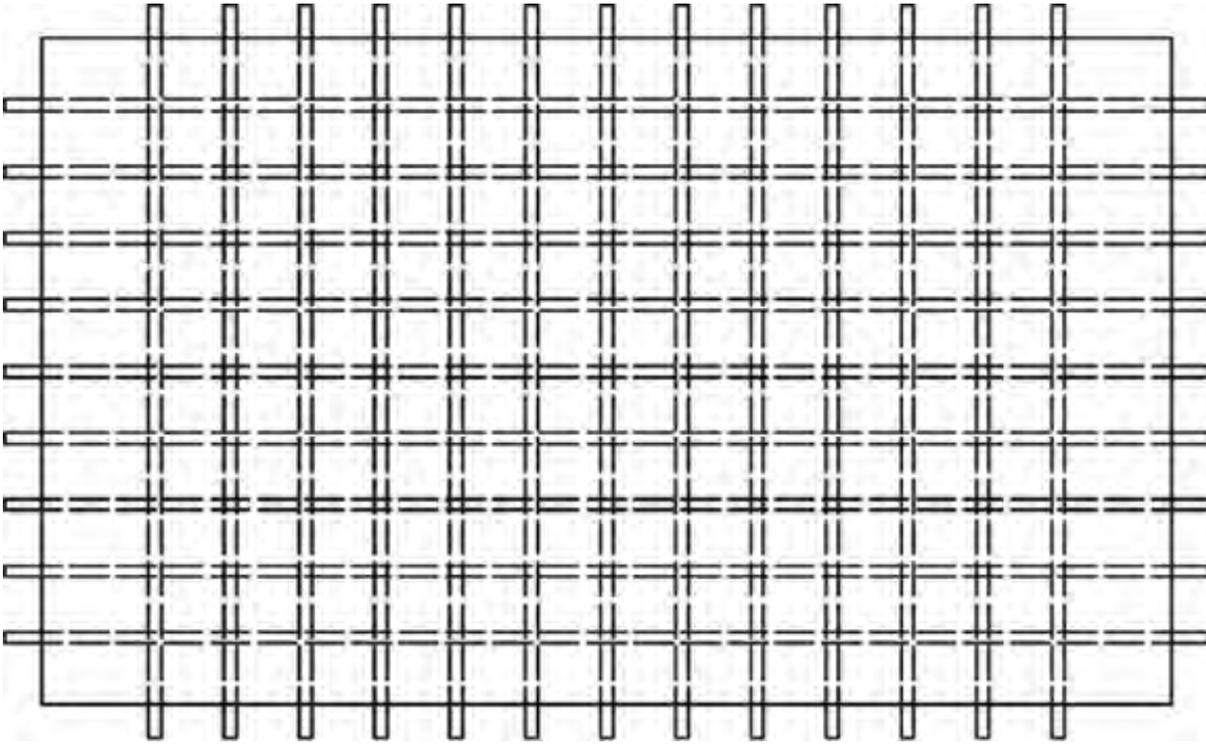


The model and drawing illustrate what another possible design solution for the school. Most of the design ideas are the same except the school is not dug into the ground because of how much earth would need to be moved to build enough schools for a camp population of twenty thousand people.

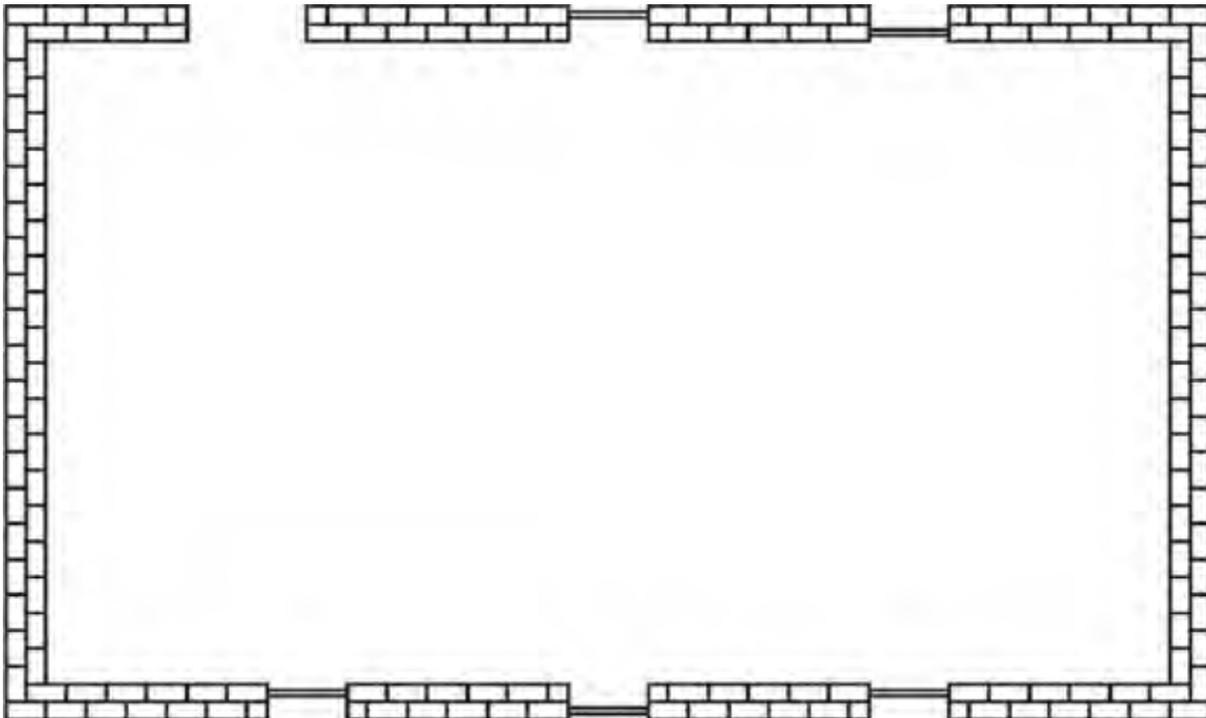
School Design

Schematic Design

Roof plan.



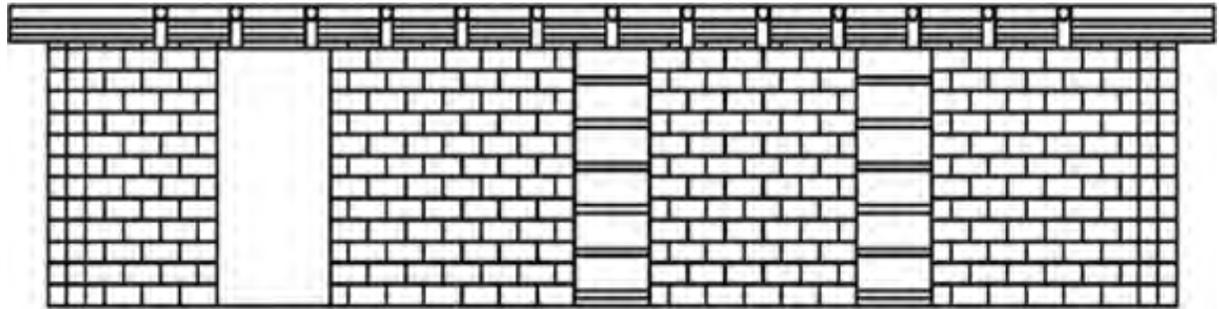
Floor plan.



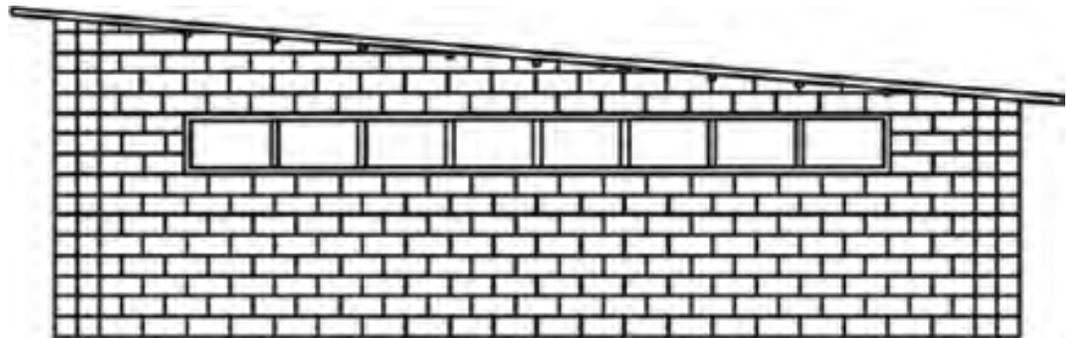
School Design

Schematic Design

Long section.



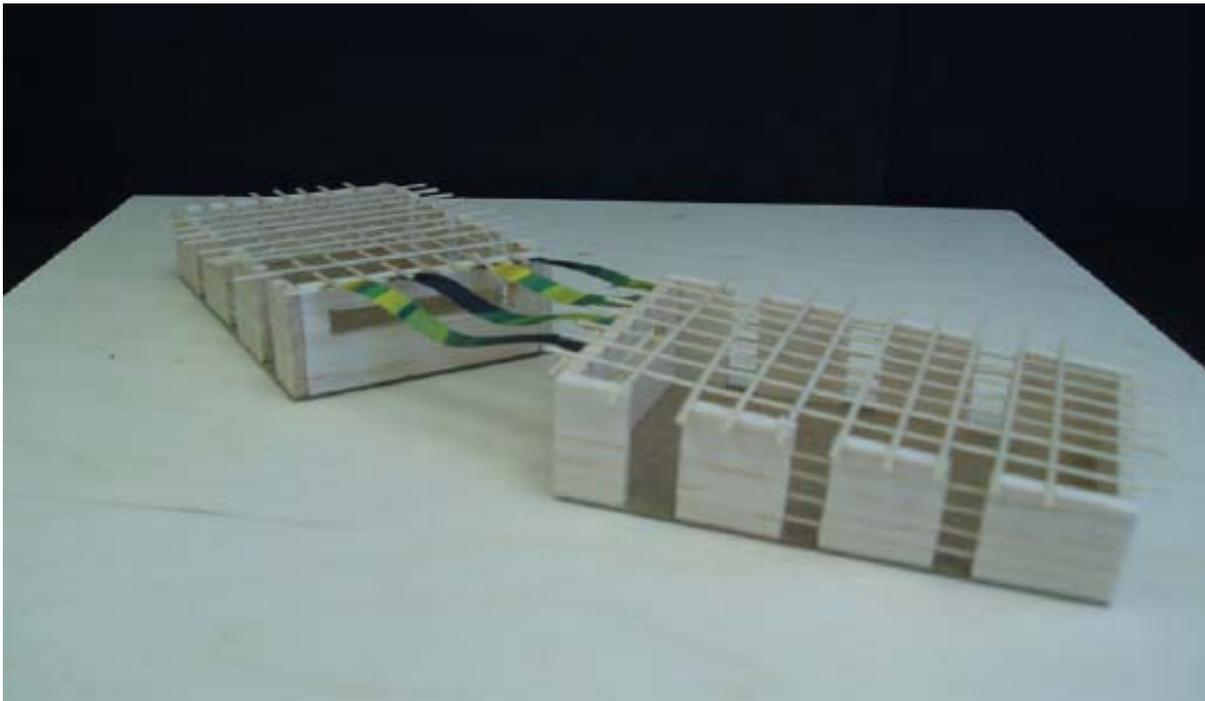
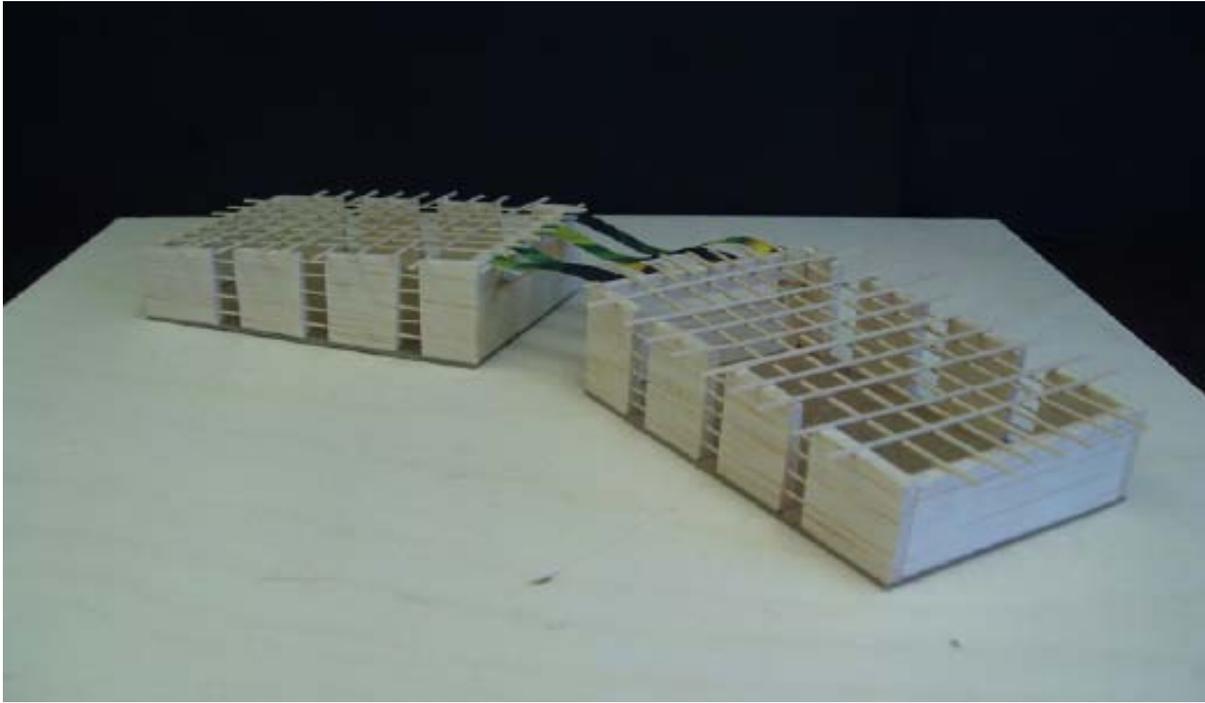
Short section.



The computer drawings illustrate the roof plan, floor plan, and sections of the above ground school design. The school would be composed of several single classroom sized buildings that would be constructed mostly of the straw brick with bamboo and thatch to create the room structure. Pieces of the goat fabric would hang in between some of the classroom buildings to create the exterior classroom and gathering space.

School Design

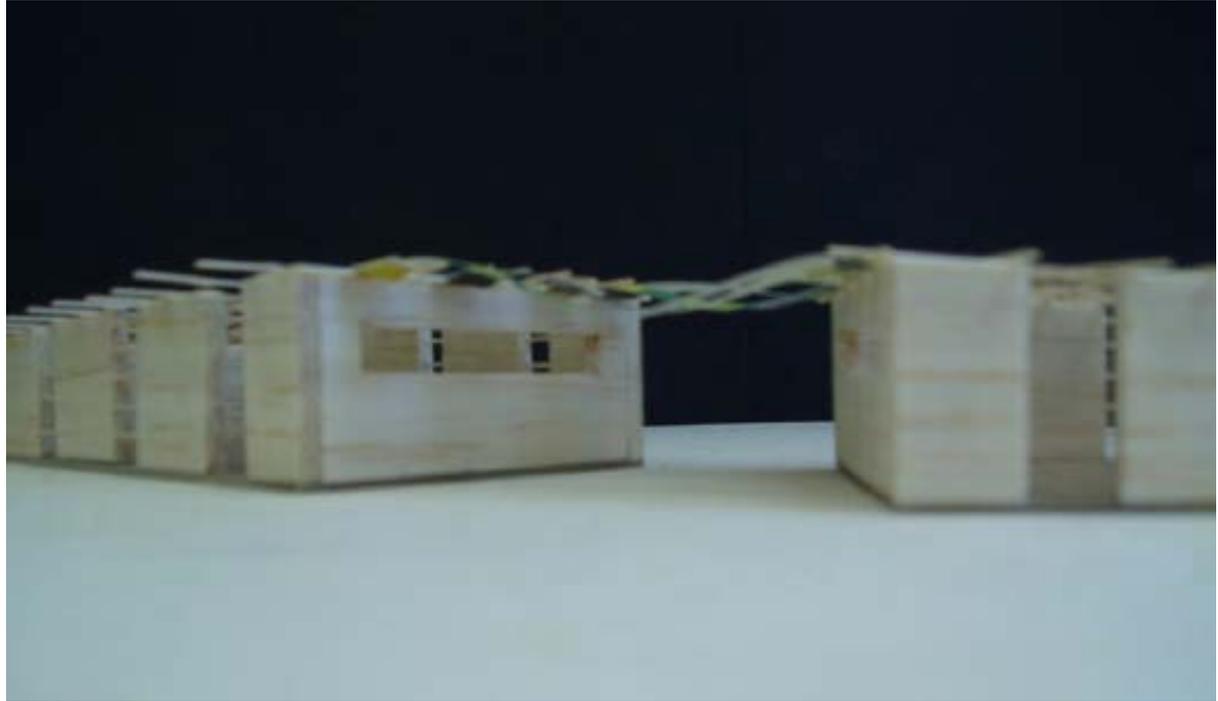
Schematic Design



The scale model represents two single size classrooms connected with the goat fabric in between the buildings to create the exterior classroom and gathering space.

School Design

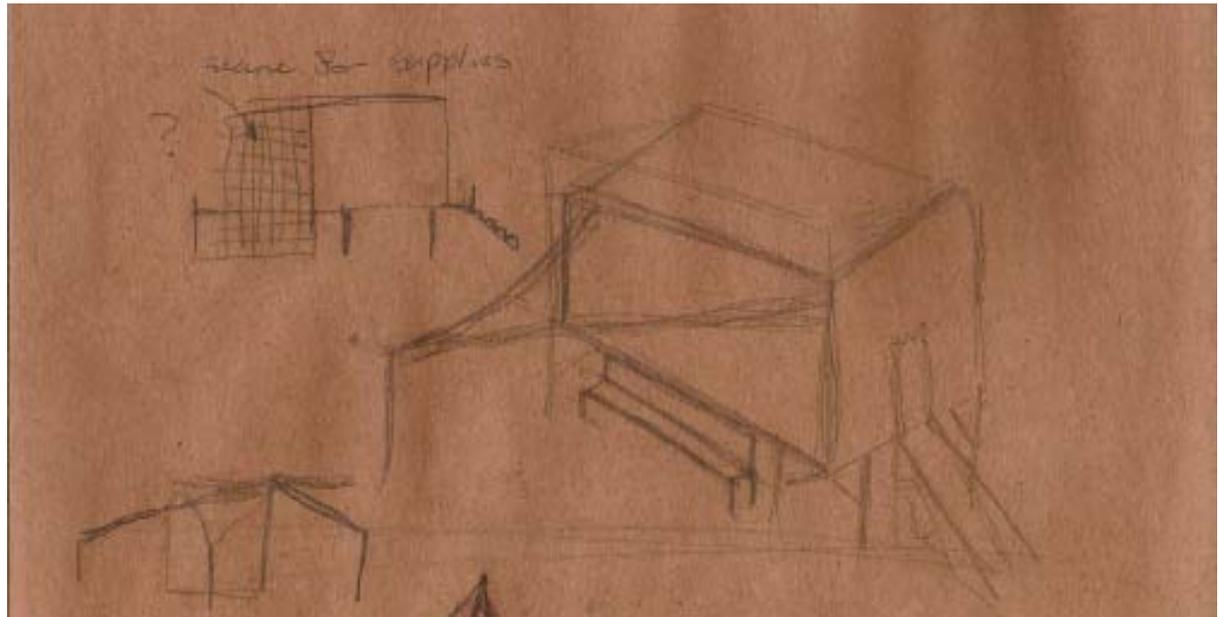
Schematic Design



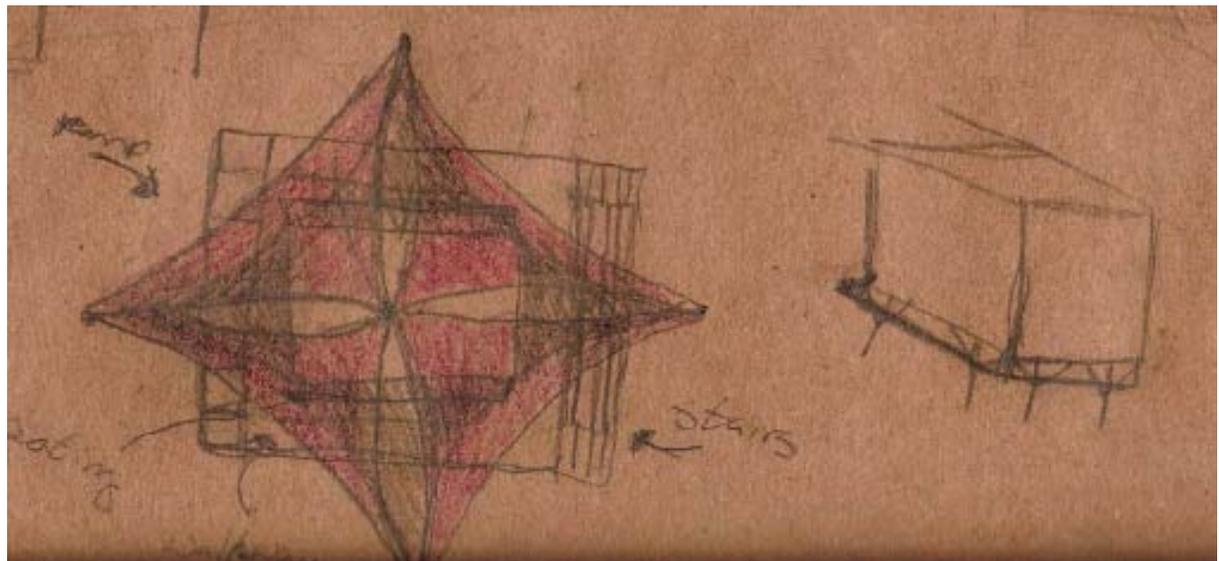
The scale model represents two single size classrooms constructed out of straw bricks with the roof constructed of bamboo and thatch. The opening on would extend the full vertical length of the building and would use bamboo as a divider between the interior and exterior of the building.

Clínica Design





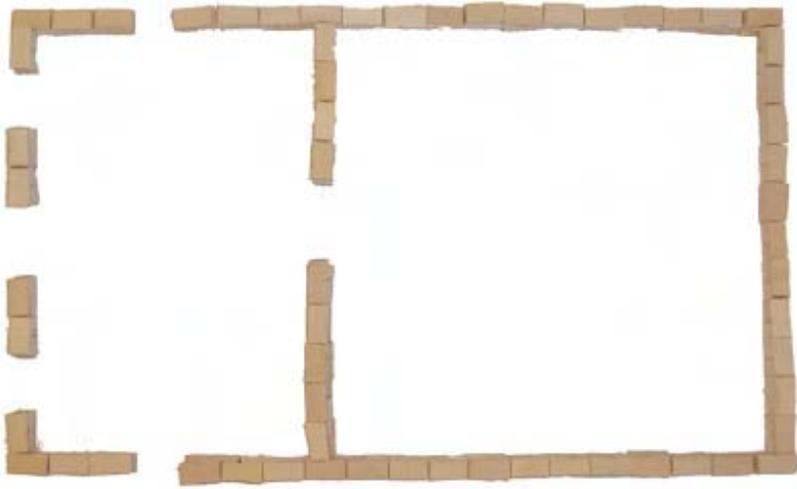
The sketches show possible solutions and configurations for the design of the clinic and the materials that would be used.



The sketches show possible solutions and configurations for the design of the roof for the clinic and the materials that would be used.

Clinic Design

Schematic Design



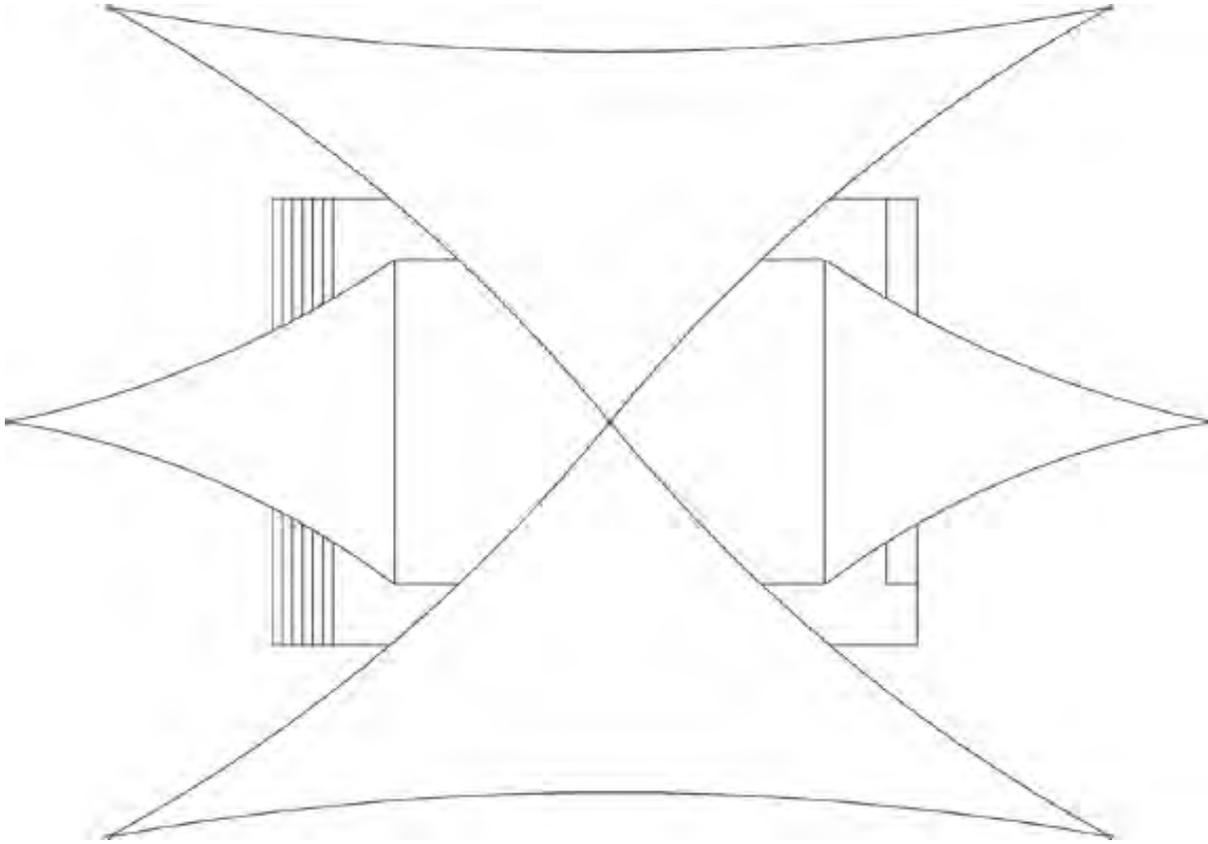


The model and drawing illustrate what another possible design solution for the clinic. The clinic shown here is constructed mainly of straw brick for temperature control and the roof would be bamboo and thatch. The clinic would consist of one building that would house three separate rooms. One room is for medical supplies, another for the initial examination, and the third room is an area for treatment of patients that do not require the hospital.

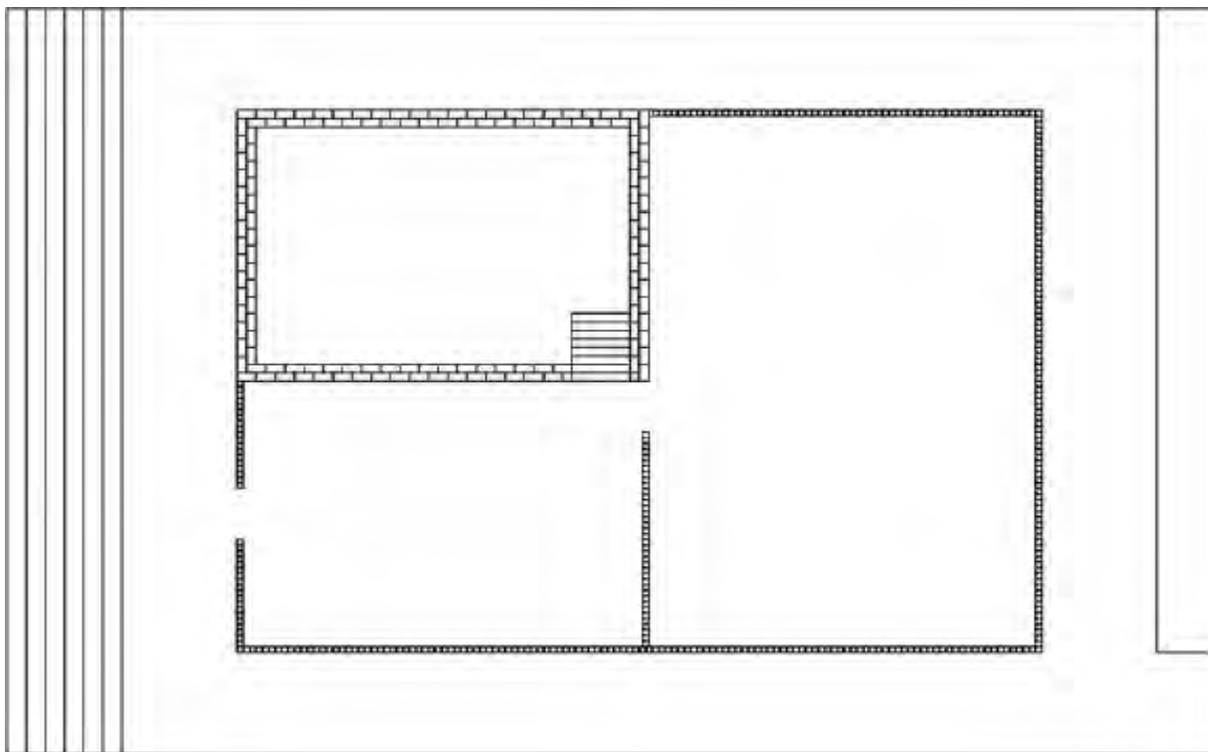
Clinic Design

Schematic Design

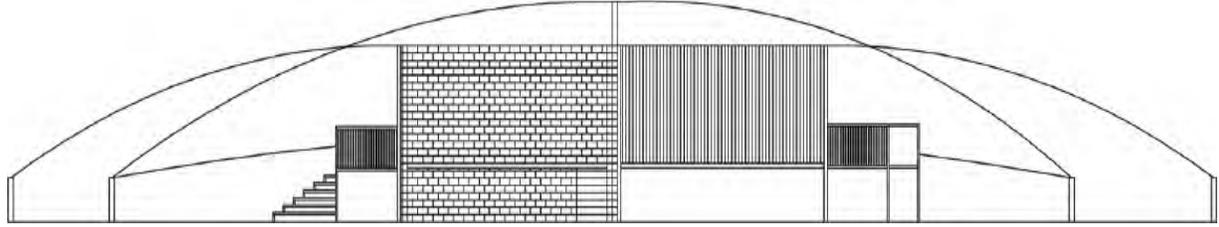
Roof plan.



Floor plan.



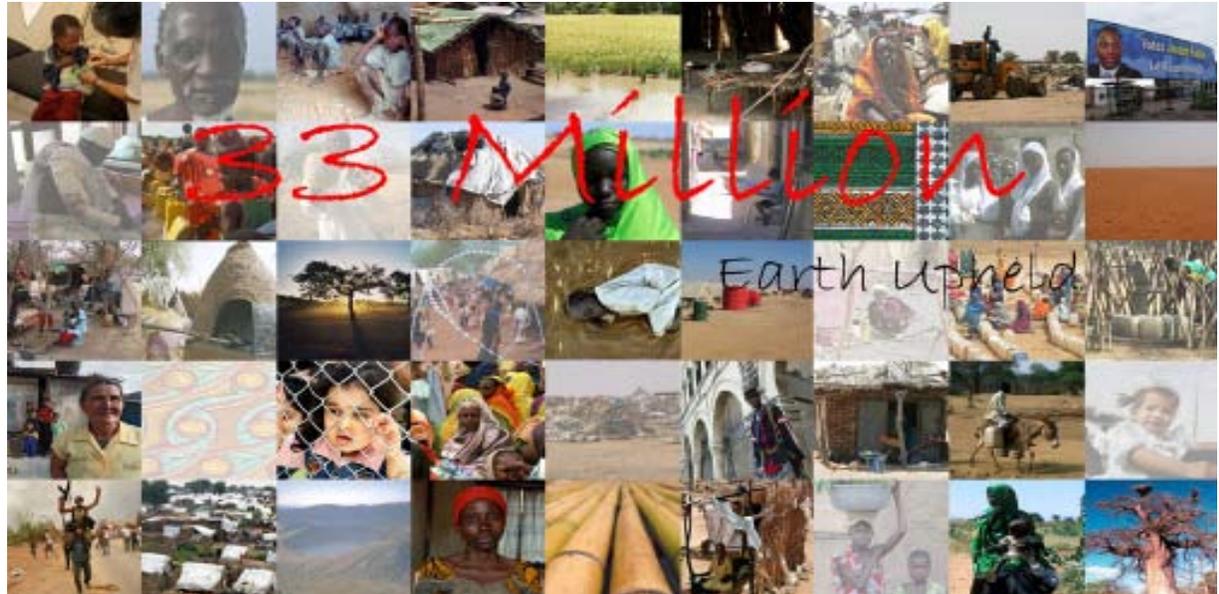
Long section.



The computer drawings illustrate the roof plan, floor plan, and long section of the above ground clinic design. The clinic is designed to be constructed of straw brick for the medical supply area for temperature control and bamboo and thatch for the other rooms of the facility. The building is raised off the ground to keep the people off the hot sand. Four large pieces of the goat fabric would connect to the building to provide shelter from the sun for the patients that are waiting to be seen.

Final Design

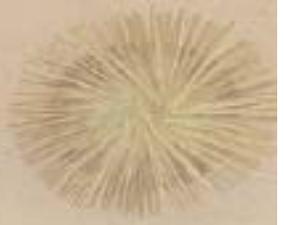


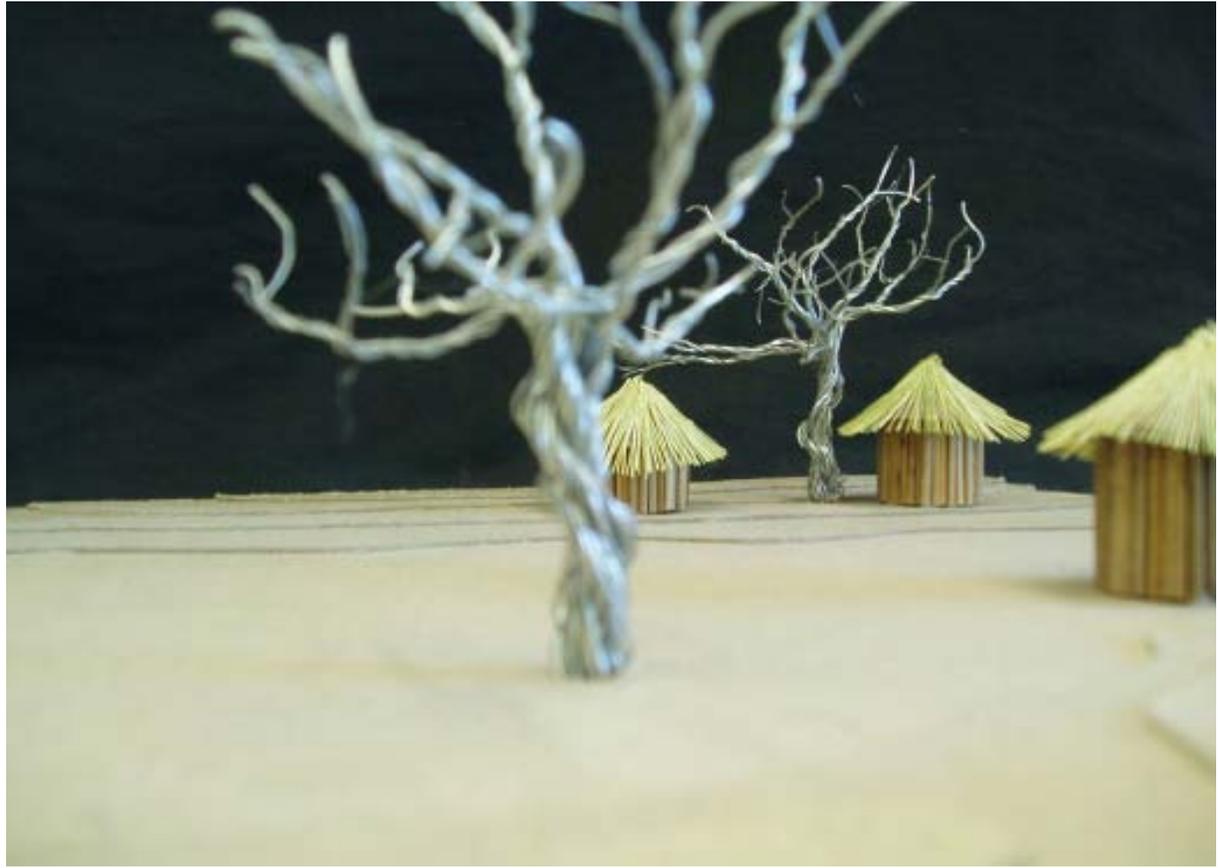


275 Mater Plan

251 Building Design

Master Plan





278 Camp Design

280 Sector Design

Camp Design



The final camp design was on site location and research. The site is located on the White Nile in the unity state of Sudan. The river acts as a natural buffer or barrier to the heart of the camp. There are three major directions around the camp. Two serve as the directions of incoming civilians and the other is the direction to the nearest city. The three possible entrances into the camp also serves as a means of escape if camp were to come under attack. The camp consists of two entrances where the fleeing civilians can get registered and examined. There is a family sector, single men sector, children sector, single women sector and an elderly sector that serves as the housing areas. There is a agricultural sector, community sector, and a market sector that is divided into two. The market sector connects the community sector to the agricultural sector. There is also a quarantine sector, and hospital sector.

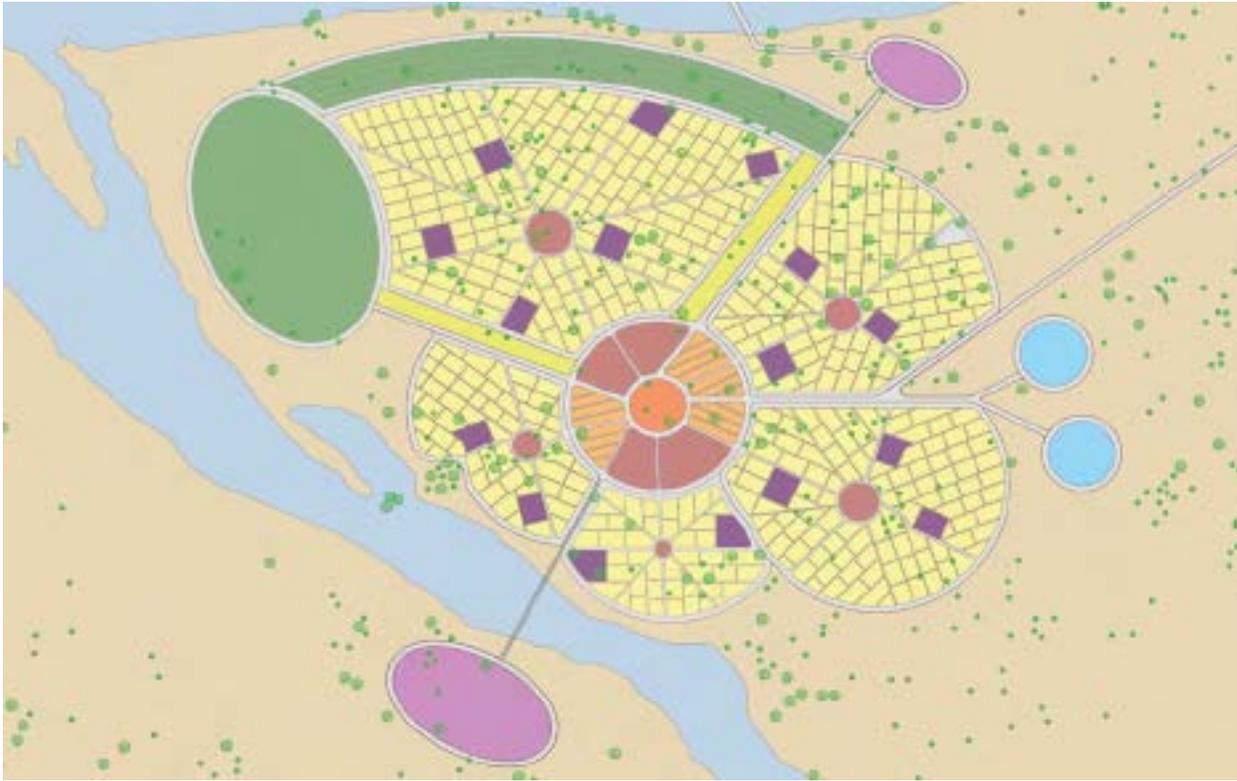


Overall camp plan.

Key

-  Agricultural Area
-  Family Area
-  Elderly Area
-  Single Women Area
-  Children Area
-  Single Men Area
-  Quarantine Area
-  Hospital Area
-  Entrance
-  Market Area
-  Open Space
-  Roads and Pathways

Sector Design



Overall sector plan.



Family sector plan.



Single men, children, and community sector plan.

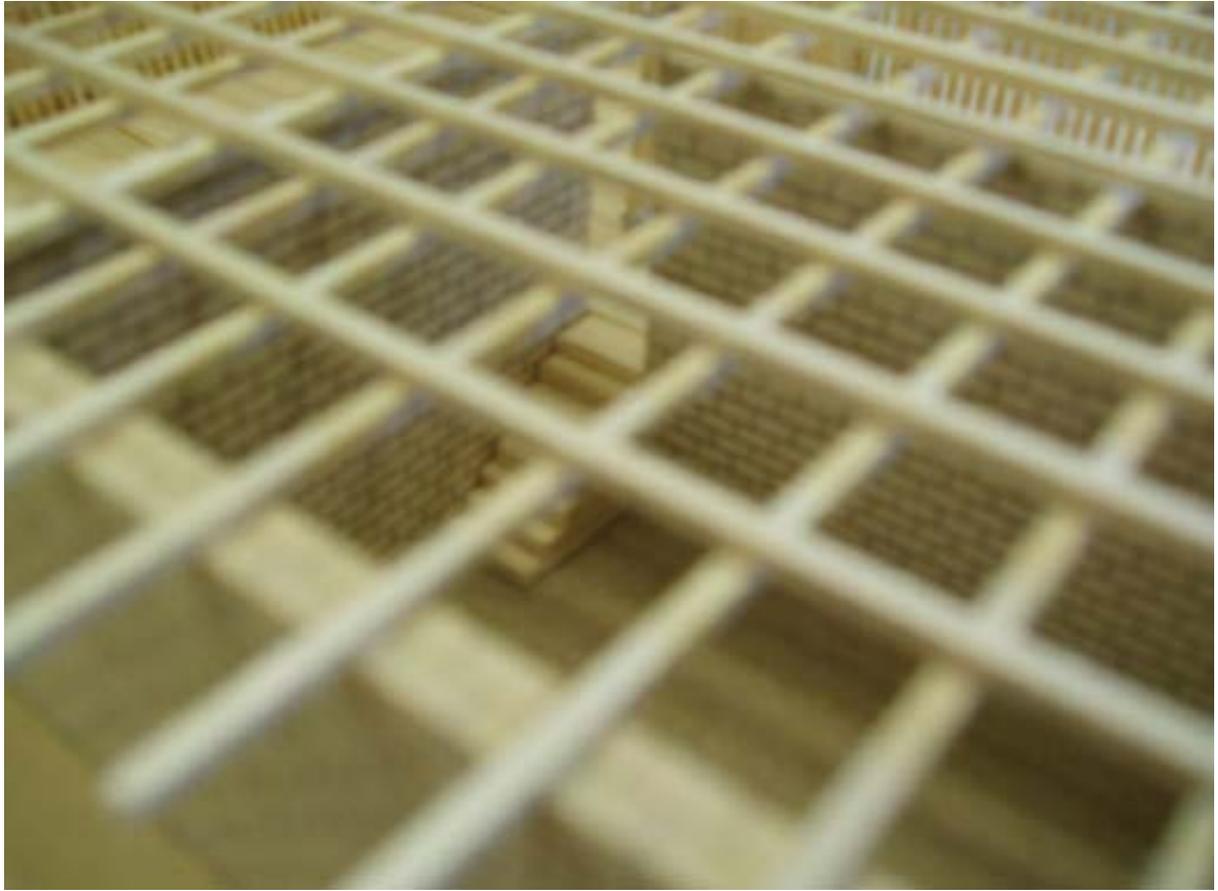


Single women sector plan.

Within each of the housing sectors broken down into the family sector, single men sector, children sector, single women sector and an elderly sector that includes housing and clinics within. The number of housing units and clinic facilities depends on the population and demographic of the sector. There is a agricultural sector, community sector, and a market sector that is divided into two. The market sector connects the community sector to the agricultural sector. The community sector includes the schools, soccer fields, outdoor theater, community meeting and celebration facilities. There is also a quarantine sector, and hospital sector. The quarantine sector is broken down into two parts. One quarantine area for people with diseases such as malaria and cholera, and the other quarantine area is for the civilians that cannot be removed from the camp such as the mentally disabled and for people who commit small crimes.

Building Design



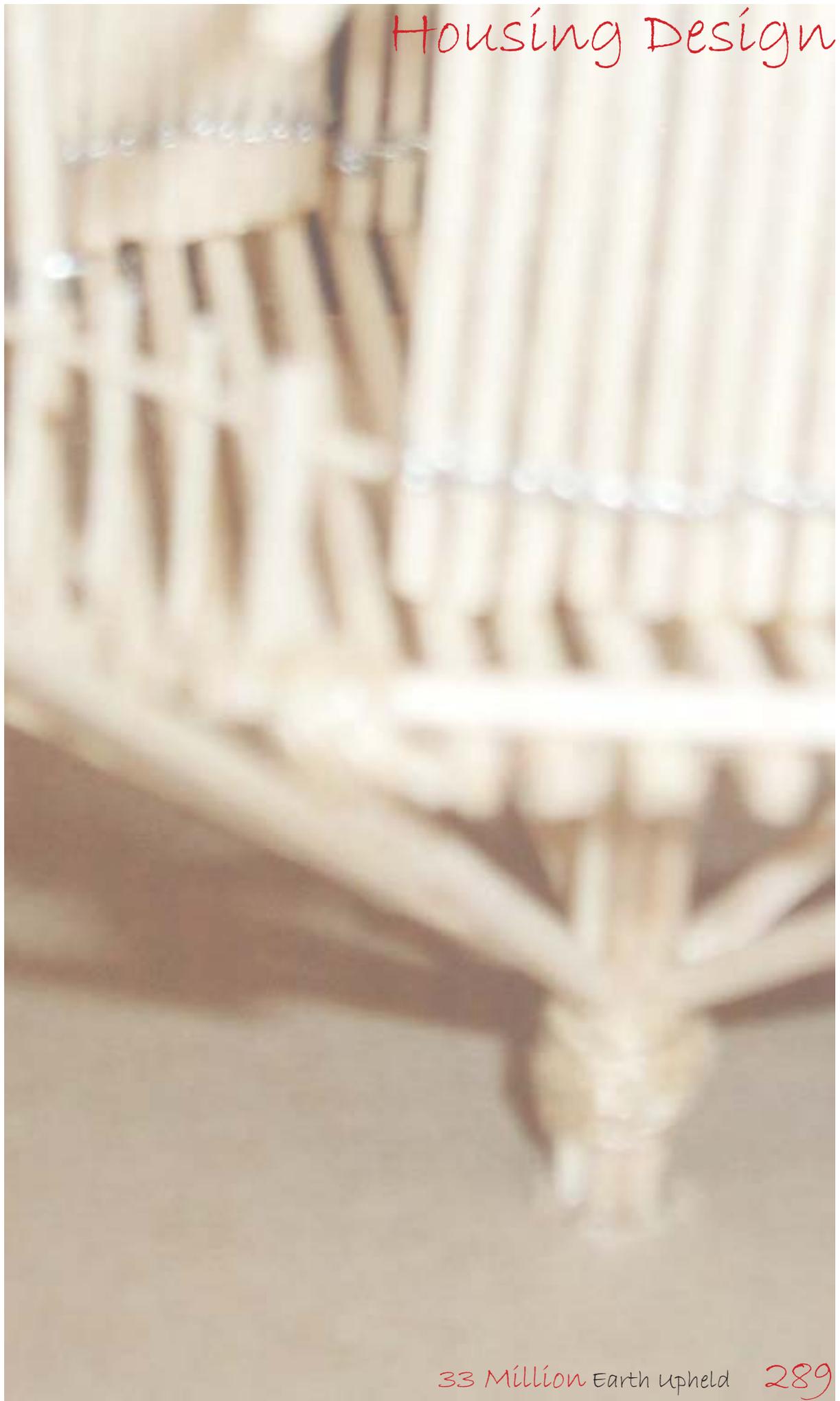


289 Housing Design

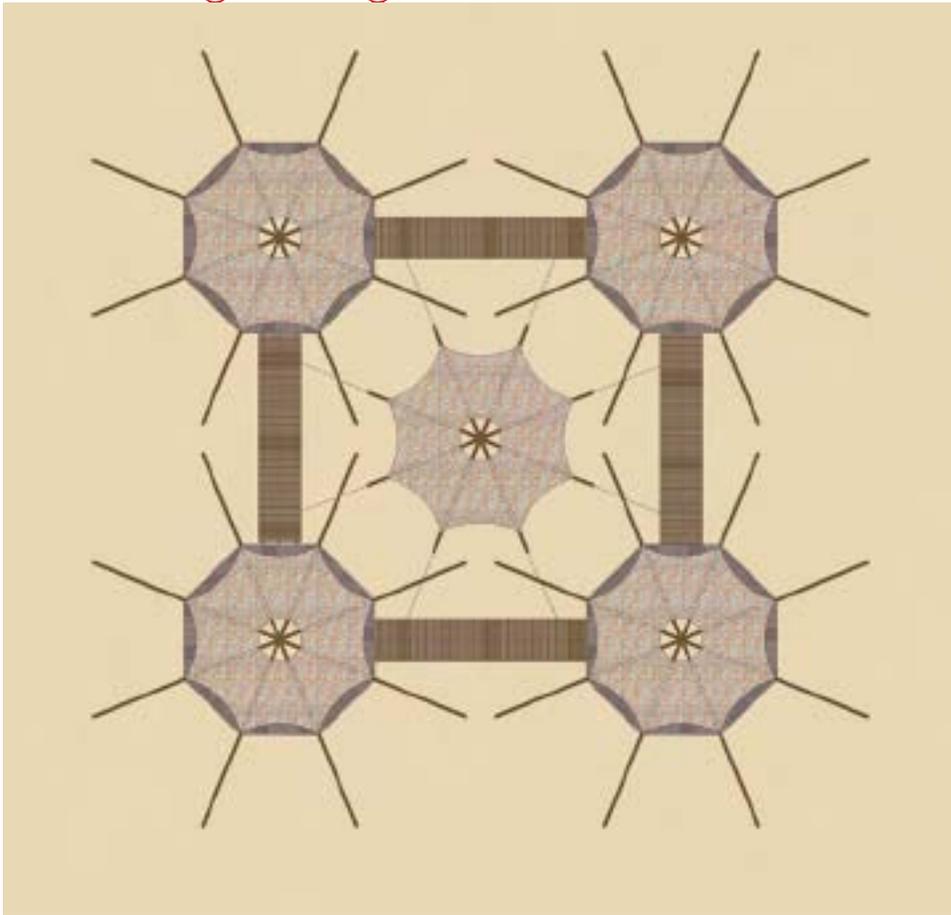
299 School Design

303 Clinic Design

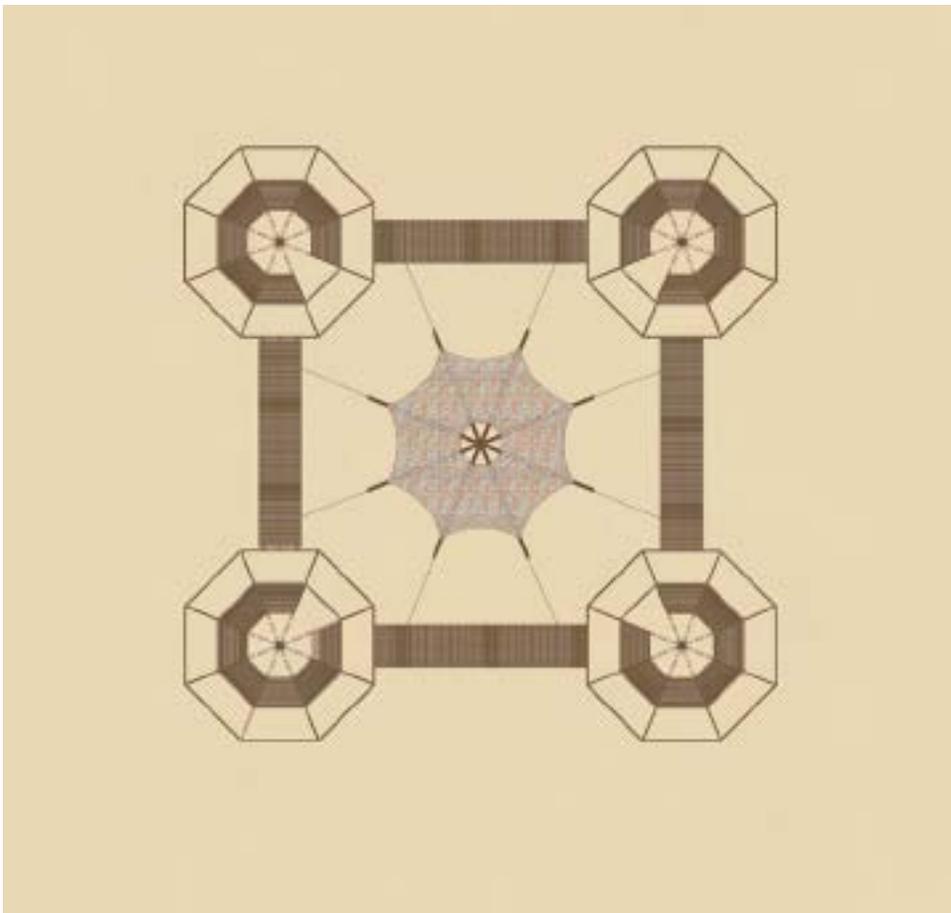
Housing Design



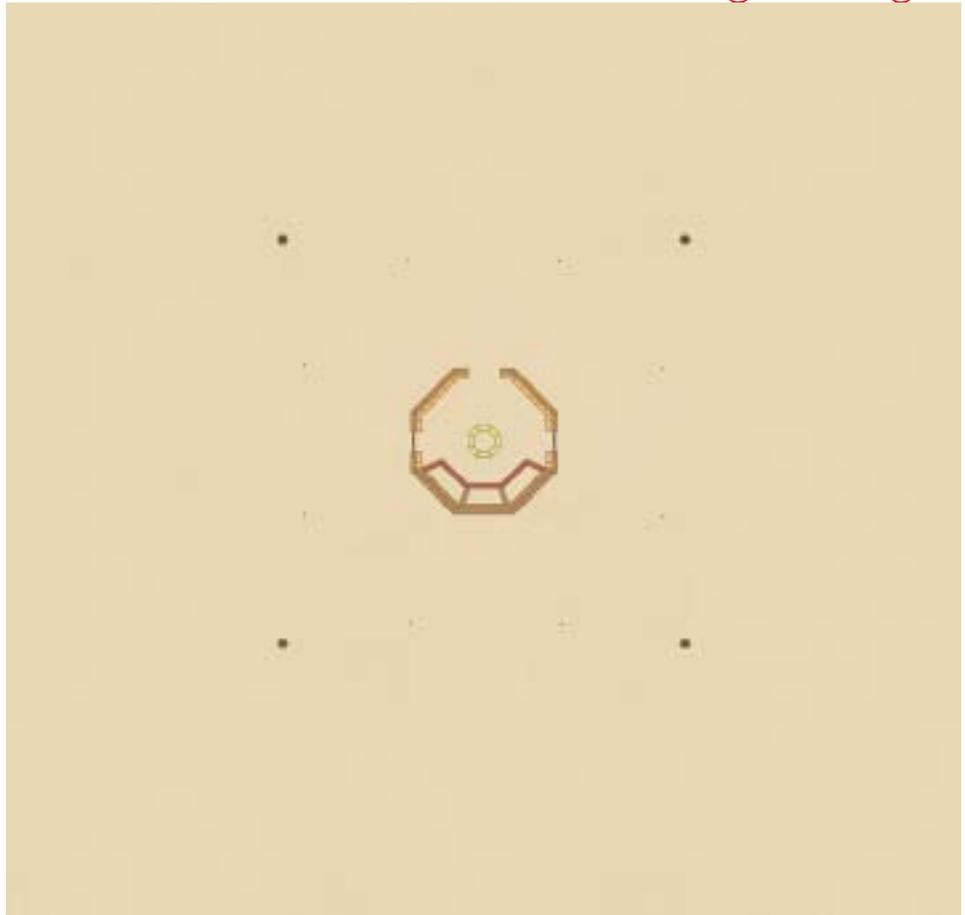
Housing Design



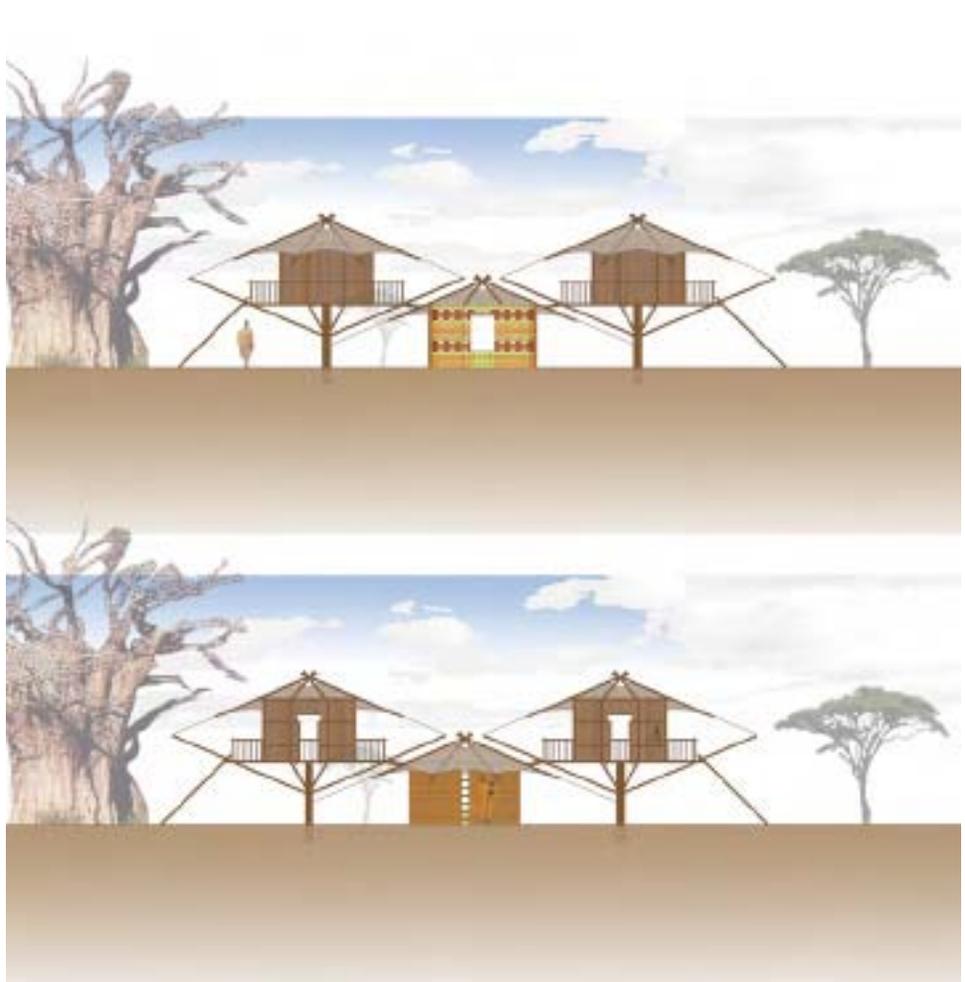
Group family housing roof plan.



Group family housing floor plan.



Group family housing floor plan.

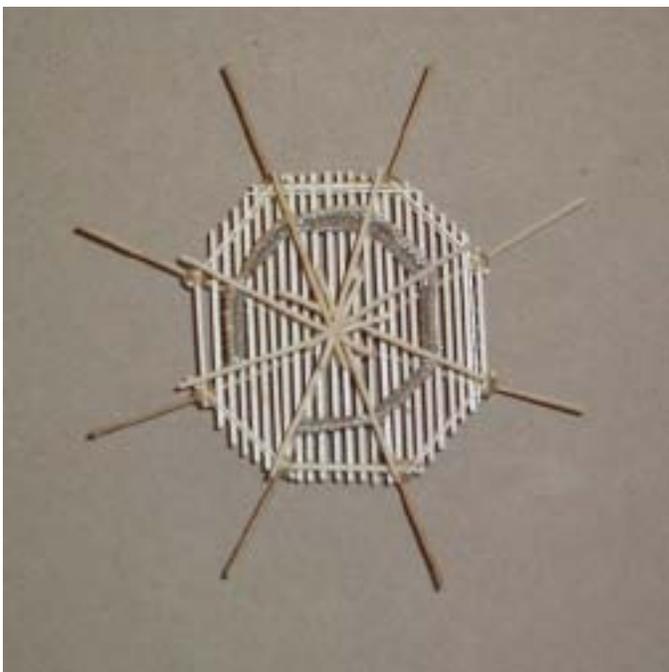


Group family housing sections and elevations.

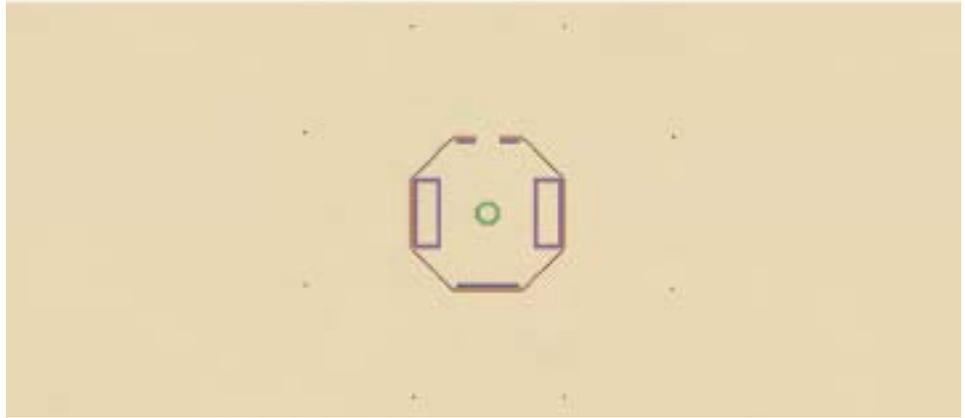
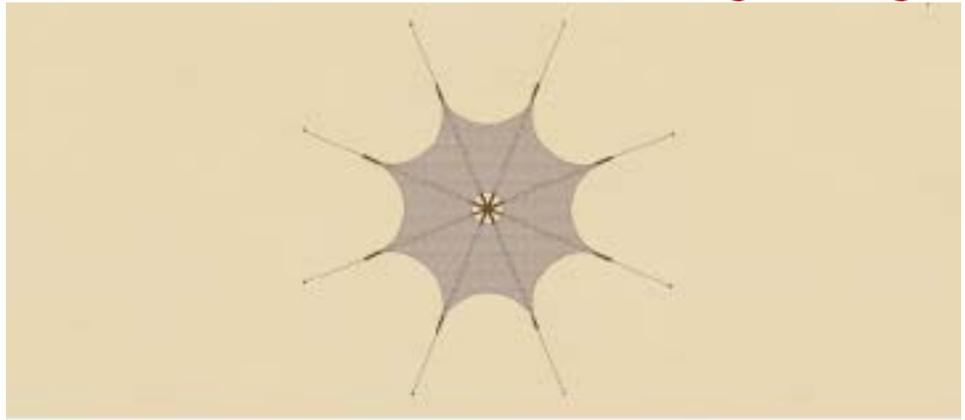
Housing Design



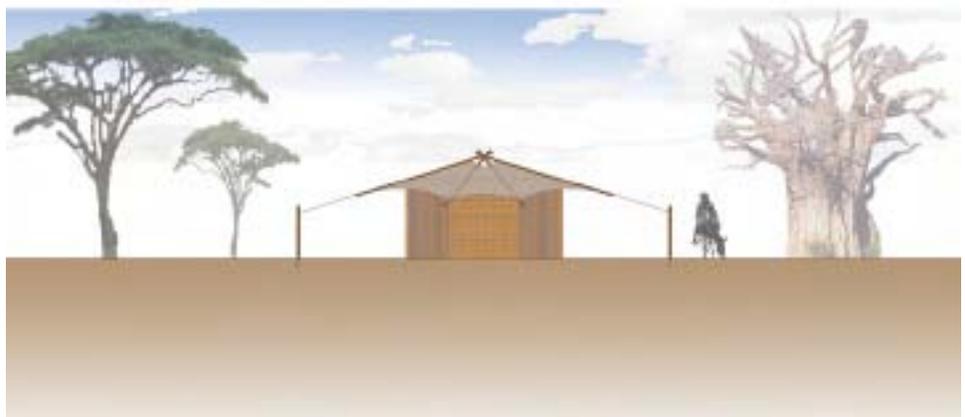
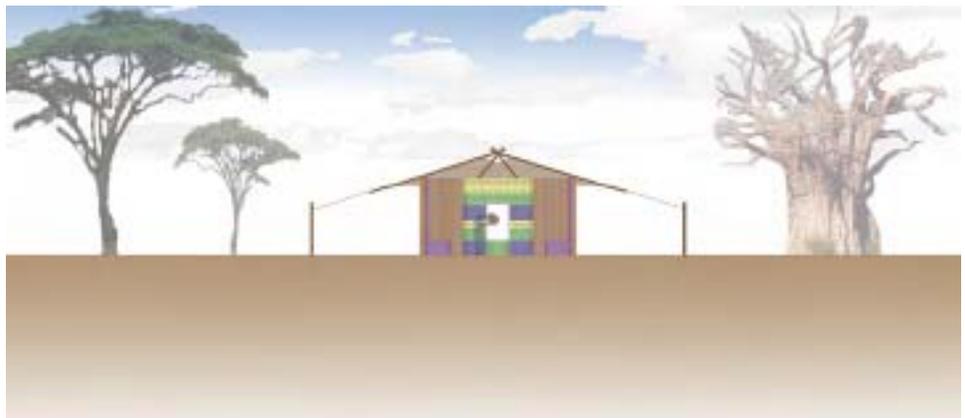
Elevation of scale model of one of the group family housing units.



Roof plan of scale model of one of the group family housing units.



Single family housing roof and floor plan.

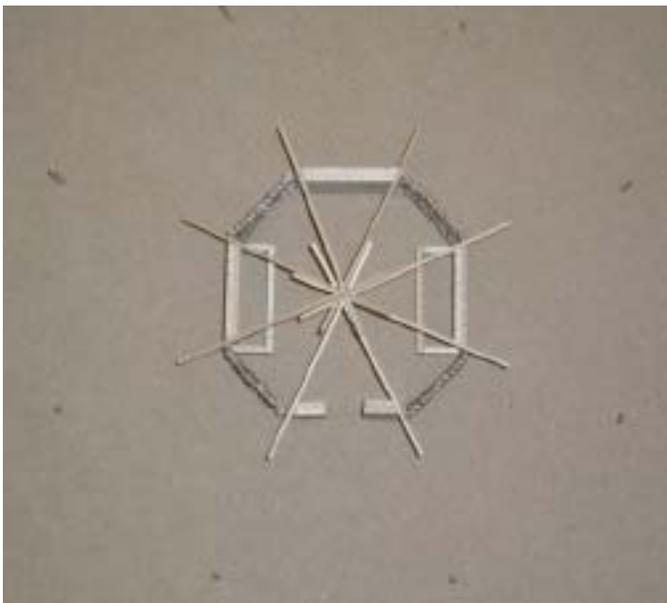


Single family housing section and elevation.

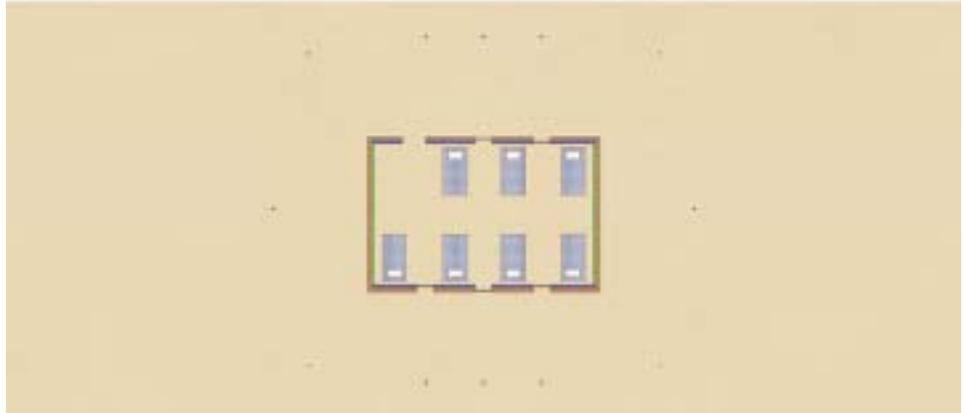
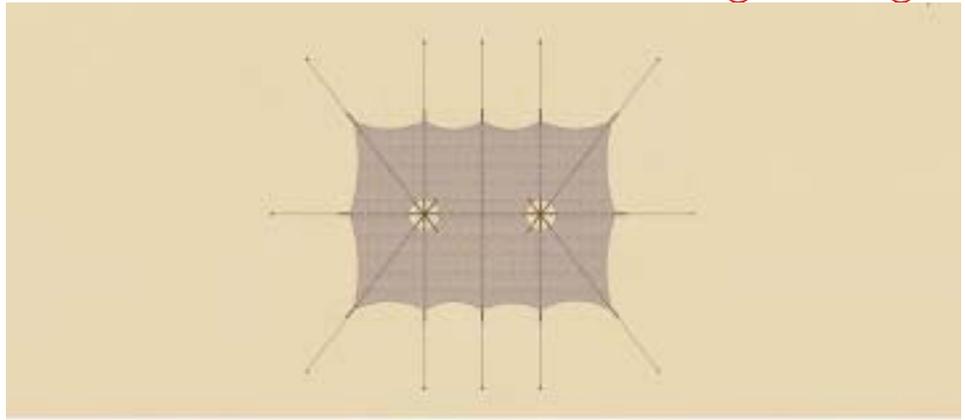
Housing Design



Elevation of scale model of the single family housing units.



Roof plan of scale model of the single family housing units.



Children housing roof and floor plan.

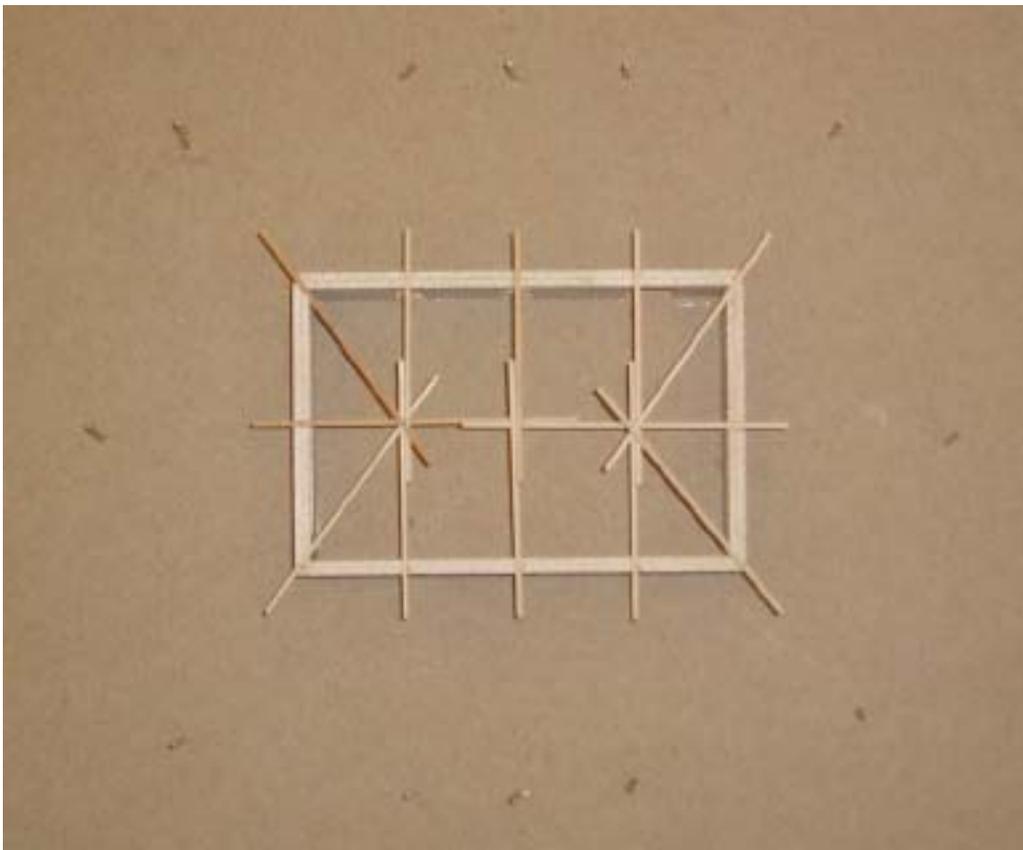


Children housing section and elevation.

Housing Design



Elevation of scale model of the children housing units.



Roof plan of scale model of the children housing units.

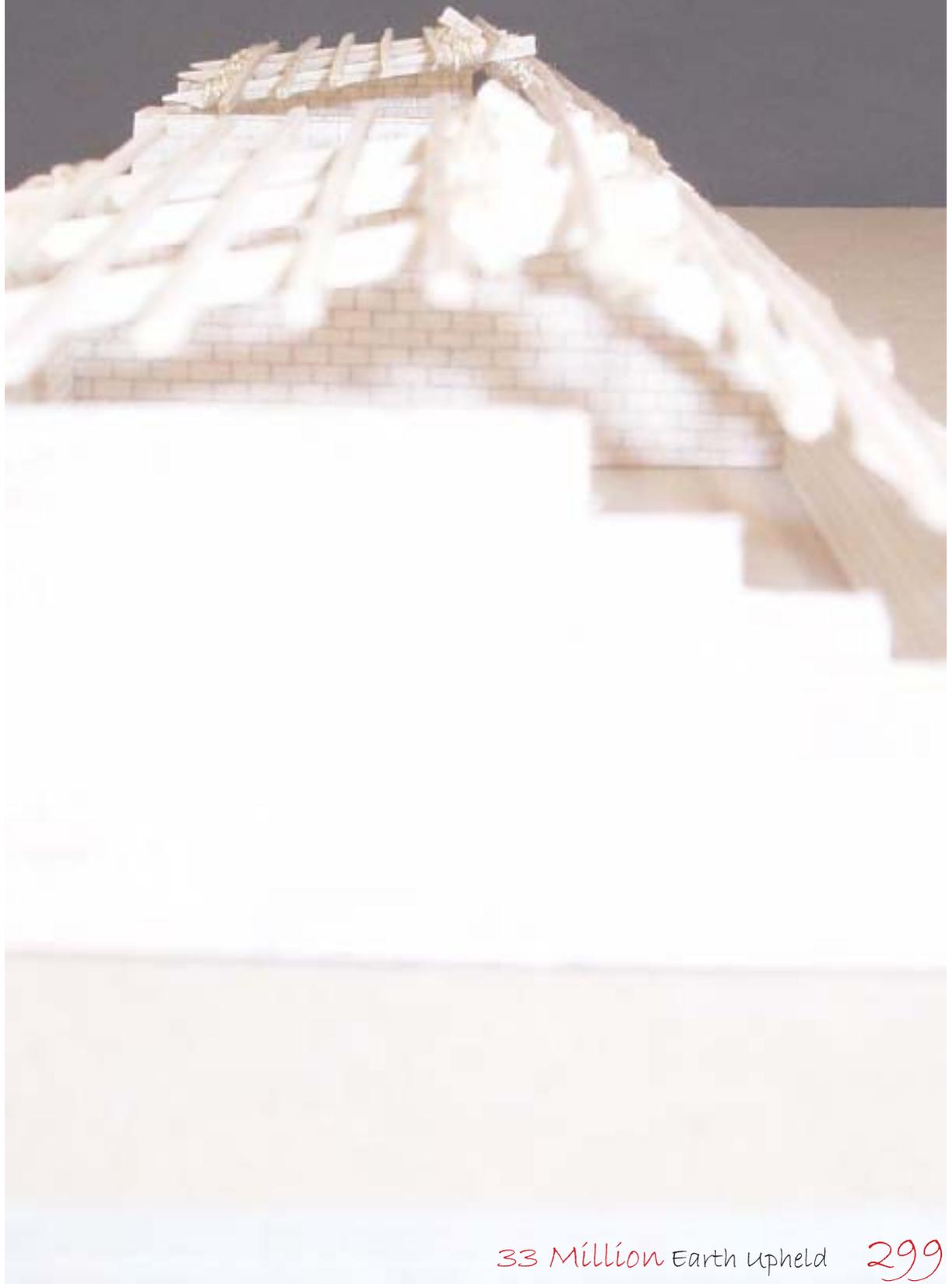


Scale materials model of a straw brick wall of color dyed bricks.



Scale material model of a bamboo wall woven with thatch.

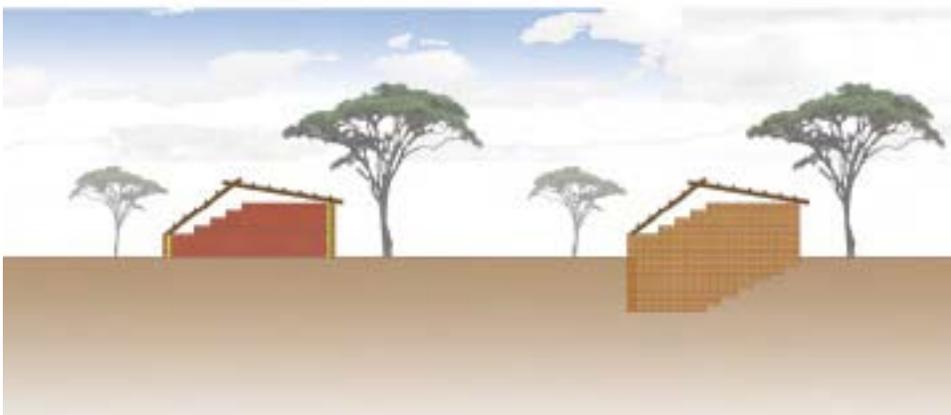
School Design



School Design

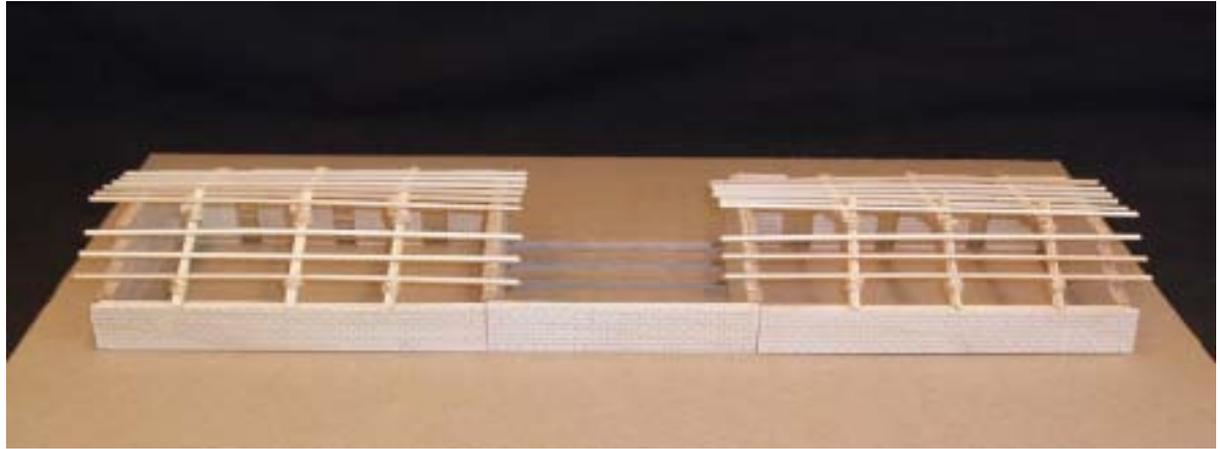


School roof and floor plan.

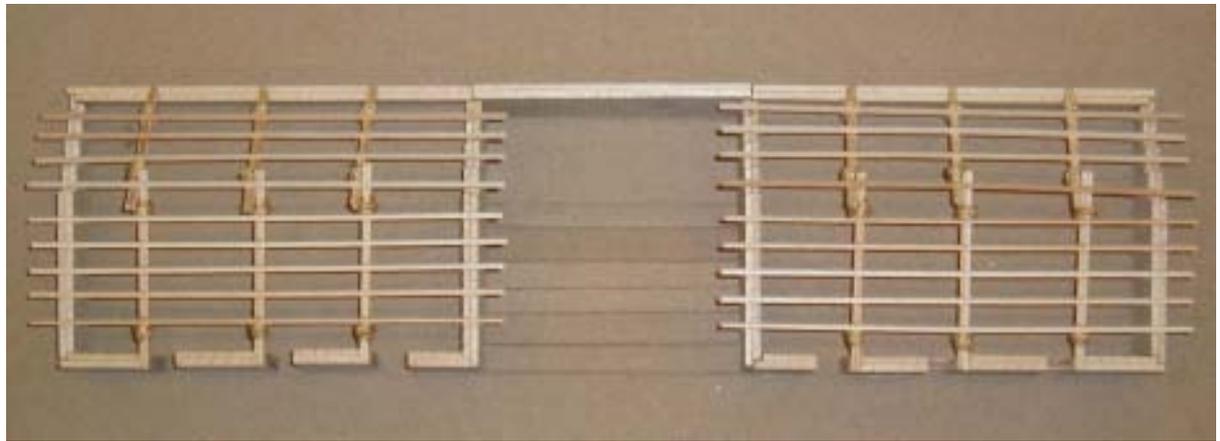


School long and short sections.

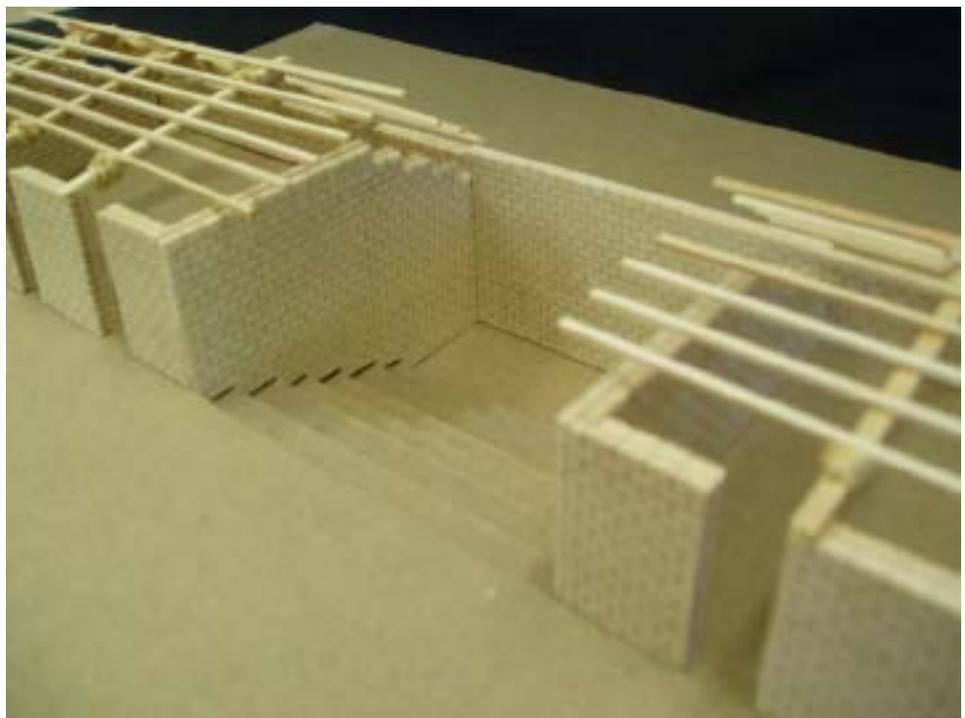
School Design



Elevation of scale model of the school units.

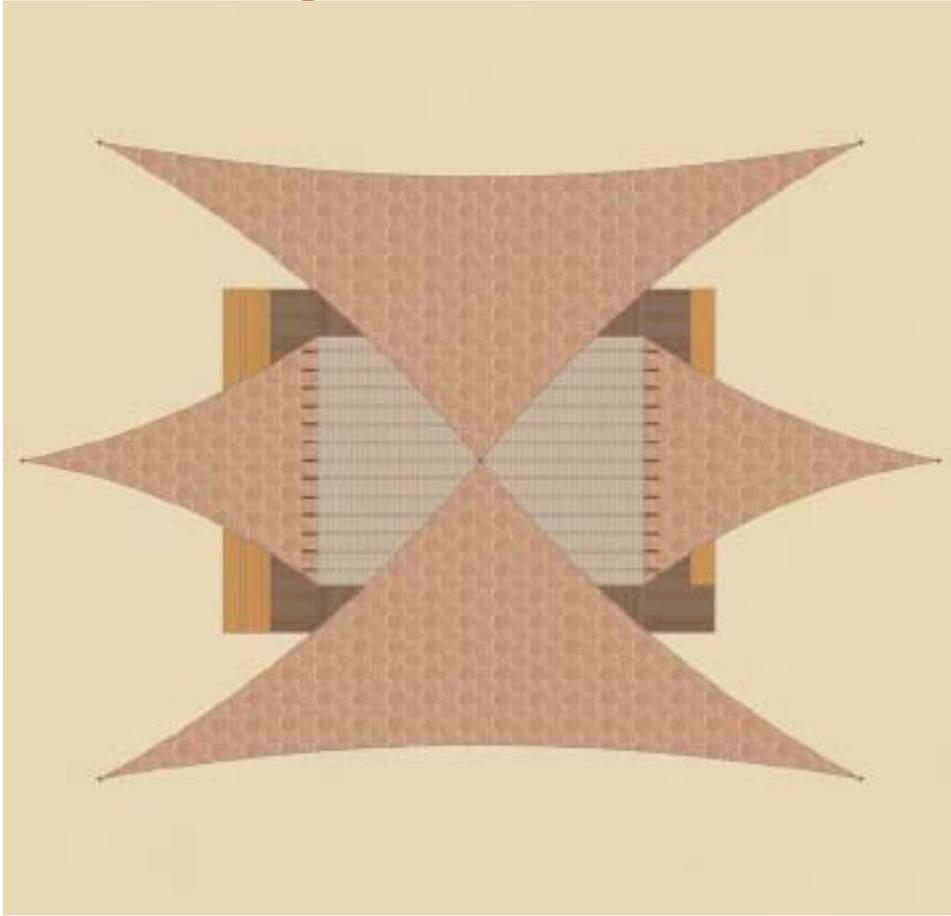


Roof plan of scale model of the school units.





Clinic Design



Clinic roof plan.

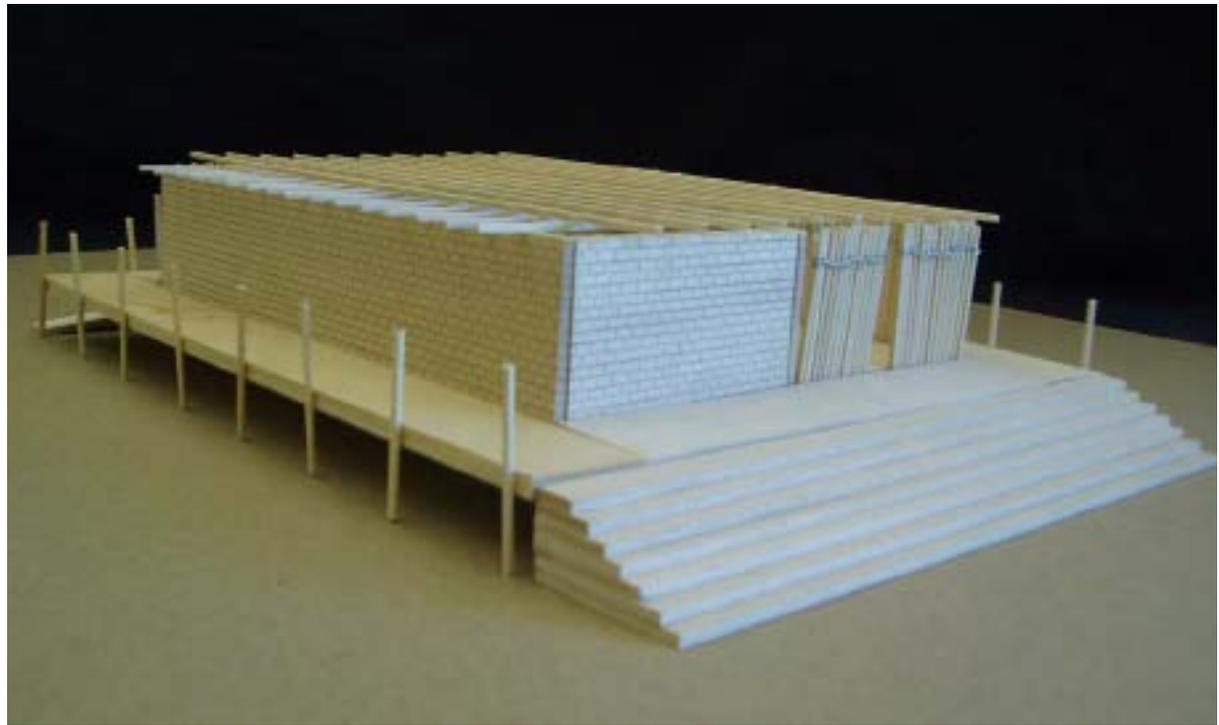


Clinic floor plan.

Clinic Design



Clinic long and short sections.



Scale model of the clinic units showing an elevation view and roof view.





311 Documents

315 Images

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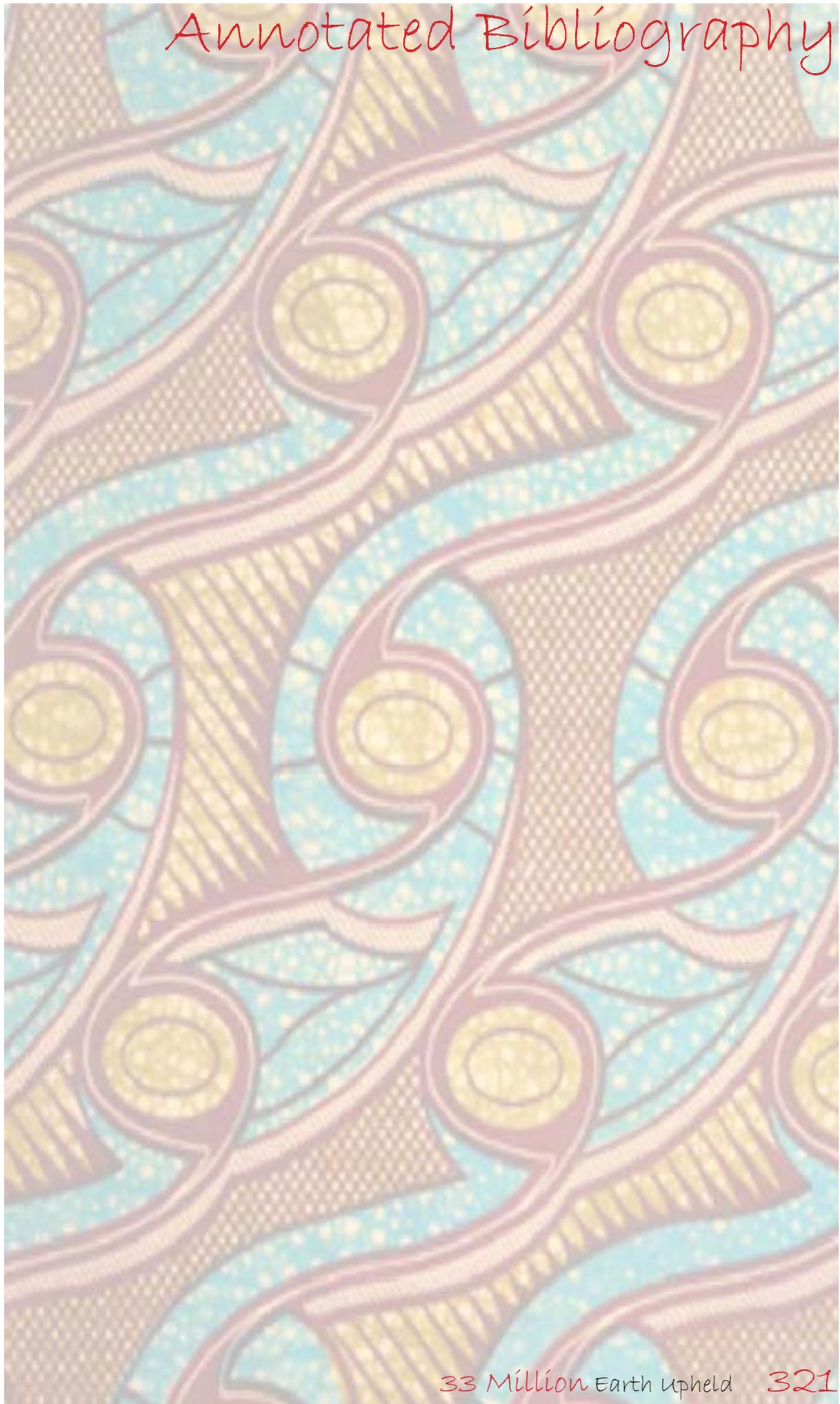
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- Page 167 Taken at "A Refugee Camp in the Heart of the City" exhibition in Chicago
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