DISASTER RELIEF HOUSING:
A study of shelter and housing evolution in FEMA camps

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CAMPING WITH FEMA

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Cristina Eloisa Moreno
This is dedicated to the first architect I ever met, my grandmother.
Hurricanes like many natural disasters, make their way unobstructed through towns and cities, destroying homes and leaving behind destruction, debris, and victims filled with desperation. Often left homeless, these victims face the tough task of recovering, and rebuilding their community. These survivors who have lost everything to the storm usually rely and depend on large aid initiatives to reconstruct what has been damaged and burned. Organizations like the Federal Emergency Management Agency (FEMA) provides victims different kinds of aid. However, many times the housing aid provided is not adequate to accommodate their grieving needs. These displaced families are in need of immediate temporary and/or permanent housing solutions that will provide the foundation to rebuild their shattered lives. Moreover, the research focused on the world-wide need for relief housing and in particular the housing crisis caused by Hurricane Katrina.

After a series of studies of FEMA camps, standard shelter/housing units and precedent design solutions to the problem; a modular system was proposed as a possible design solution to relief housing. The modular system intends to be flexible enough to adapt to the different needs at each of the four housing stages (i.e. emergency sheltering, transitional housing, temporary housing, and permanent housing). The proposed solution addressed the development of Renaissance Village, a FEMA Group Site in Baker County, LA. The developed design tracks the evolution of the system both at the large community scale and the single family unit scale. The solution also addresses the transition from temporary housing to permanent housing and how it relates to the recovery of the family.
INTRODUCTION

RESEARCH TOPIC

PROJECT OUTLINE

- TOPIC OVERVIEW
- DISASTER RELIEF HOUSING
Architecture is an element of survival in its most primitive form as much as a form of luxury and artistic expression. Even in today’s society most of the world’s population sees architecture as the basic need for shelter and not an elaborate display of wealth and social standing. Architecture is the primal instinct of accommodation; a basic need of life that provides us with cover, protection and a refuge from weather or any other adverse conditions in the environment. When natural disasters strikes, the lack of appropriate housing and shelter plays a very influential role in the recovery of the region. Underdeveloped areas with limited resources tend to suffer extreme casualties as a result of these calamities. I think it is the responsibility of designers to investigate new solutions to enhance the quality of life of these victims and aid their rehabilitation. For survivors, the repercussions of natural disasters fall deeper than just the immediate aftermath. These extreme situations of desperation result in hostile conditions and often test the integrity of victims that have been stripped violently of all possessions and have no place to call their own.

During this recovery time, inadequate temporary housing options become incubators for disease and devastation. The housing issue addressed in this thesis is not limited to immediate natural disaster relief efforts. These catastrophic events have consequences that can be traced for decades. The issue of need for emergency response housing can be linked back to one of “America’s most pressing social problems” – the lack of adequate housing for the lower-income class (Levy 2009). For the lower income class, adequate affordable housing is a growing need. Associated unemployment and homelessness can lead to family break up and may have links to other social pathologies. It is our responsibility as designers to develop solutions to support these victims all over the world with post-disaster rebuilding aid.

“This U.S. is facing a situation similar to what many developing countries have faced after massive disasters: how to house large displaced populations. The solution is often to lay down as many units of housing, in a grid, as quickly as possible. This is great for politicians and terrible for the people who end up living there” (Brake 2014).

This was noted by Mary Comerio, a professor of architecture at the University of California, Berkeley who has studied disaster recovery. After Hurricane Katrina, it has become apparent that this is a pressing problem; not only for those developing countries with refugee camps for internally displaced individuals but Americans are also suffering from lack of emergency response housing efforts in times of crisis (Brake 2014). It takes years to rebuild communities that have been devastated by natural disasters. During that time, temporary housing becomes the breeding ground for disease and desperation. There is a need for permanent solutions from the start, a crucial factor that will aid families in rebuilding their lives and reestablishing their future lives.

Figure 1 – Biloxi, Miss., September 3, 2003 – Damage and destruction to houses in Biloxi, Mississippi. Hurricane Katrina caused extensive damage all along the Mississippi Gulf coast. FWSHA/Mark Wolfe
Disaster relief housing is architecture in its most primitive form, the instinct of shelter; a basic need of life that provides us with a home. Adequate housing fosters a sense of “home” within a dwelling that can lead to family togetherness, proper social development for children and facilitates coping with the tragedies. A large portion of the people displaced by natural disasters will remain homeless for years to come. The need for emergency response housing has become one of “America’s most pressing social problems” (Aquilino 2014). For the lower income class, adequate affordable housing is a growing need. Associated unemployment and homelessness can lead to family break up and may have links to other social pathologies. It is our responsibility as designers to develop solutions to support these victims all over the world with post-disaster rebuilding aid.

Architects are vital instruments in “creating a significant change in how disaster relief and development are practiced” (Aquilino 2011). Housing solutions offer the victims with a regained sense of stability and hope by providing struggling families with a haven and a refuge from the hardships of life. Adequate housing fosters a sense of “home” within a dwelling that can lead to family togetherness, proper social development for children and facilitates coping with the tragedies. A large portion of the people displaced by natural disasters will remain homeless for years to come. The effects of Hurricane Katrina in 2005 are still being felt by the people of New Orleans. It takes years and a lot of commitment to rebuild communities that have been devastated by natural disasters.

Figure 2 - Aerial views during an Army search and rescue mission show damage from Hurricane Sandy to the New Jersey coast. (Master Sgt. Mark C. Olsen/FEMA)

The aftermath of Hurricane Katrina sparked a great deal of humanitarian efforts. Habitat for Humanity gathered 70,000 volunteers to build seventy-two frame houses for displaced Katrina victims along with ten senior-living apartments (Hinson et al. 2013). Even though the numbers for aid efforts may seem large, the number of unprotected and vulnerable victims keeps rising to an unprecedented scale.

It is not financially responsible to erect temporary housing solutions that require replacement with permanent buildings later. The current temporary housing units must last well beyond its proposed lifetime. More often than not, these units are used for 2-6 years as temporary housing, a long-term need it was not designed for and a result of lack of financing for permanent solutions. This reality leads to inadequate and unhealthy living conditions that create the urgent and world-wide need for quick and durable housing solutions, particularly following natural disasters.

Figure 3 - The UN Development Programme employed hundreds of Haitians to clear roads and to make fuel pellets in a cash-for-work scheme (Adam Roger/UN Photo Library)
INTRODUCTION

RESEARCH TOPIC

PROJECT OUTLINE

- PROJECT OVERVIEW
- AIMS & OBJECTIVES
This thesis project aims to investigate immediate and practical solutions to the displacement/homelessness crisis caused by large-scale natural disasters. The research is concentrated mainly on the housing emergency caused by Hurricane Katrina in 2005. The design consists of a system that intends to be flexible and adaptable to address the needs of the refugees through all the emergency housing stages. The design will address affordability of the design, ease of transportation, assembly and construction, the durability and reusability of the materials chosen, and the adaptability of the design to accommodate the growing needs throughout the recovery process.

The proposed solution will attempt to optimize the space available and also reach a compromise between the benefits of minimizing construction costs and the often negative impacts that these cost-cutting choices may have on the long-term performance and efficiency of the dwelling. The project will also focus on the transition from temporary housing to permanent housing and defining the threshold of the final housing stage. The design aims to shorten the process of implementation and construction because it is based on a modular system that can grow with each housing stage and evolve to meet the needs from victims that arise as time goes on and their personal recovery cycles develop. Right after the disaster strikes and victims are left homeless, their needs are basic shelter, food and access to sanitation facilities. Later on, their needs will develop to include independence, access to transportation, recreational space and other amenities.

Aims of the Design
- Transition from temporary to permanent
- Define shelter, home, house, dwelling
- Minimize housing impact on refugee’s recovery
- Provide adequate housing
- Housing intended for permanence

Problem Statement Questions
Can the components or the overall building be reused or recycled?
What are the environmental implications of transporting the shelter?
What is the life expectancy of the shelter?
How adaptable is the shelter design?
Can the unit undertake a modification of function or form in order to suit the precise needs required?
How is the shelter solution responding to the local needs?
Does the shelter protect against specific weather conditions, physical hazards and other external dangers?
Is the project economically sustainable for the particular disaster? Where are the budgets obtained from?
Are transportation means environmentally friendly?
How long is the shelter supposed to be used for?
Would the implementation of the shelter solution have a negative impact on the local natural environment?
Did the design consider how the shelter solution may be managed or utilized by disaster relief organizations?
Could the design be tailored by its users or adapted to their cultural customs?
Did the design consider disabled victims?
Would the use of the shelter promote reconstruction or is there a danger for it to become a permanent solution?
Will the project contribute to restate or connect local communities?
Did the shelter solution served as transition for the reconstruction of permanent facilities?
OBJECTIVES

Objective 1: Analyze and investigate the need for disaster relief housing and how these camps are formed and developed.

Objective 2: Analyze and document the successes, failures, processes, and organization of the Katrina disaster relief camps. Different type of housing aid camps will be analyzed and compared to identify and investigate which are the main needs of displaced victims and how architecture can potentially provide answers to these solutions.

Objective 3: Investigate FEMA’s role as an aid provider, how the organization offers assistance to hurricane victims and determining all the different housing needs of the victims.

Objective 4: Investigate the different standard units of shelter provided by different organizations at different scales (e.g. UNHCR tents, military tents, trailers, or manufactured homes).

Objective 5: Investigate and evaluate current proposed housing relief design solutions. This objective will consist of two case studies and a series of shorter investigations to recent proposed design solutions.

RESEARCH TOPICS

1 - Camps
2 - Hurricane Katrina
3 - FEMA Assessment
4 - Standard Housing Units
5 - Precedent Studies

After conducting the research, the findings of the previous studies were evaluated and a solution was proposed addressing the topics encountered. The findings were used to determine which are the techniques that develop the most successful, energy and cost efficient solutions while addressing the needs of the hurricane displaced victims.
RESEARCH TOPICS

- CAMPS
- HURRICANE KATRINA
- FEMA ASSESSMENT
- SAMPLE HOUSING UNITS
- DESIGN PRECEDENT
RESEARCH TOPIC 1

CAMPS

- HURRICANE KATRINA
- FEMA ASSESSMENT
- SAMPLE HOUSING UNITS
- DESIGN PRECEDENT

OVERVIEW

CAMPS OF NECESSITY
- UNHCR Camps
- FEMA Camps
The camp is the space that opens up when the state of exception starts to become the rule - Agamben

Camps are temporary settlements that grow for many of different reasons. Defining a camp is a subjective issue because of its unclear existence.

There are three types of camps: camps of autonomy, camps of control and camps of necessity. All these types of camps however follow a similar lifecycle shown below. These different stages of the camp will differ generally by the purpose for which the camp is used for. These camps result from varying circumstances like political conflicts or natural disasters. Due their rapid deployment and temporal nature, camps have become a phenomenon of modern society. There all kinds of camps surrounding us. Many have even taken to use these camps as signs of protests like Occupy Wallstreet.

This research aims to focus solely on those camps that arise from necessity. The main two providers or organizers of camps like these are the Federal Emergency Management Agency (FEMA) and the United Nations High Commission on Refugees. These two organizations have aided millions of families left homeless, displaced and in despair administering these camps and allowing settlement in these extreme or emergency conditions.

Autonomy

Camps of Autonomy: This is an event-space, the sitting for a camp involves the arrival of the event, the premise of camping as a method

Clearing

The stage of clearing attempts to intentionally define the camping space

Making

The event and process of camping, the physical making of a temporary structure as well as the social interactions.

Breaking

The idea is that a camp of necessity will cease to exist once the necessity has been met

THREE CATEGORIES OF CAMPS:

Autonomy

Control

Necessity

Camps of Control: Camps of control are usually signs of political authority. These are mostly military camps and they exert control over those that reside in there.

Camps of Necessity: These camps are formed normally from self-settlements of individuals that for reasons beyond their control have been internally displaced and find themselves homeless.
Necessity Camps are also known as refugee camps. A refugee camp is a temporary settlement built to receive refugees. These refugees could be homeless and seeking refuge for numerous reasons. In Kenya, the main reason for their displacement is the hunger famine along with political turmoil. These type of refugees sometimes is forced to flee to another country escaping the war in their own homeland. In the United States the main reason for these “refugee” camps is homelessness and the lack of affordable housing. These camps grew all over the country when the housing crisis after Hurricane Katrina hit, housing hundreds of families at a time up to even six years after the storm hit. However, these camps do not compare in size to camps like Zaatari and Dadaab were hosting over a hundred thousand people is common. As of 2012 the average camp size is around 11,400. These camps are also usually built and run by a government and/or their departments like FEMA, international organizations like United Nations and the Red Cross or individual non-profit organizations. These camps are set up in an impromptu fashion and designed to meet basic human needs for only a short time. Due to crowding and lack of infrastructure, some refugee camps are unhygienic and lead infectious diseases, including epidemics. Some of these refugee camps exist for decades and some are needed for only a couple of months. These camps sometimes grow into permanent settlements and even merge with nearby cities or communities (UNHCR 2012).

Refugee

A refugee is that who because of reasons beyond his/her control has been forced to question their political belonging to a territory and been placed into a temporal undefined status, or a “person without a country”. The term refugee is also assigned to hurricane or disaster survivor victims because they have been displaced from their homes. While a refugee is deemed so by political or economic notions, he/she are usually more concerned with humanitarian and social efforts. Refugees are mostly concerned with seeking a quality of life that was denied in the “birth-place” or that they were recently stripped from. The refugee has lost all rights as a citizen and is no longer assimilated with a national identity, not the one he/she fled from nor the one that they fled into. In a way a political refugees have also been stripped from the contemporary world and seeks a more primal way of life while awaiting the cease of political unrest or the return to their homes. While awaiting the end of this “temporal” condition the camp may become their perpetual territory. The correlation between camp and refugee lies in the fact that their temporal nature characterizes them both as “undefined” and thus notions of legal matters and laws become “undefined” or no longer enforced since there is no established formal control or entity. “Institution is dissolved by the state of exception in which it was founded” (Agamben 2012). Both camp and refugee are terms that are place outside the normal juridical and social order and called into question because of their so loosely defined existence.
The world’s largest refugee camp, Dadaab, is currently supporting more than 450,000 people (October 2011), with up to 1,500 more coming in every day. For these refugees, the famine in Africa has taken a toll on their lives and they have been forced out of their countries and homes to seek a better and safer environment with better living conditions than the ones they were experiencing. Despite dangers, thousands of refugees every week are making the journey, walking for weeks across the desert and surviving its hardships. These self-settling camps are impressive in their development and have been the

In 2011 refugees fled Somalia in such numbers that the existing camps in Dadaab Kenya couldn’t hold them. They settled on the outskirts of Dagahaley and Ifo in self-built structures. These are at the edge of Dagahaley and the refugees here are being moved to Ifo extension a tented camp that opened in August 2011 that is closer to services, schools and health centers. October 2011 (Dadaab Stories).

The adjacent diagram shows the relationship between the organizations and the precise aid they provide to these refugees. These camps have served as a model for many other refugee camps around the world. Like Zatarri, the larger Dadaab camp network consists of five smaller camps that generated with time and as camps became overpopulated.
The Federal Emergency Management Agency is an agency of the United States Department of Homeland Security, initially created in April 1, 1979. The agency’s primary purpose is to coordinate the response to a disaster that has occurred in the United States and to mitigate the resources of local and state authorities. FEMA’s mission is to support our citizens and first responders to ensure that these build sustain and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards. The governor of the state in which the disaster occurs must declare a state of emergency and formally request from the president that FEMA and the federal government respond to the disaster. While on-the-ground support of disaster recovery efforts is a major part of FEMA’s charter, the agency provides state and local governments with experts in specialized fields and funding for rebuilding efforts and relief funds.

FEMA Aims to:
- Assess factors that contribute to disaster effects
- Identify risk reduction opportunities
- Educate the public in methods to reduce risks
- Promote hazard mitigation community planning
- Project sustainable community development
- Provide grants to fund hazard mitigation projects
- Provide technical assistance to State, Tribal and local governments to utilize rebuilding as an opportunity for enhanced local codes and ordinances.

ASSISTANCE AGENCIES
- FEMA Headquarters, Regional and Joint Field Offices
- Federal Agencies
- Department of Housing and Urban Development
- Habitat for Humanity
- Congress
- Faith-based organizations
- Non-profit organizations
- Voluntary Agencies
- United Nations
- Community Emergency Response Team
- U.S. Department of Homeland Security
- U.S. Department of Transportation
- Federal Disaster Recovery Coordinator
- U.S. Department of Housing and Urban Development
- U.S. Department of Transportation

KEY PLAYERS IN RELIEF HOUSING
- Public Sector: Manufacturers and contractors.
- Professionals: Architects, planners and engineers.
- Policy-making Administrators: Federal/State/Local government
- Organizers: Managers of post-disaster shelter/housing programs

FEMA + HUD RELATIONSHIP
The Disaster Housing Assistance Program (DHAP) is a pilot federal housing assistance grant program recently implemented by HUD and FEMA. DHAP will extend rental coverage for families displaced by Katrina by providing temporary rent subsidies for non-HUD assisted individuals and families. The DHAP is administered by Public Housing Agencies (PHA) that are currently administering a housing choice voucher program. Perhaps the most certain direction, as exemplified in FEMA’s own actions over the last several years, is a greater reliance on a growing partnership with HUD in large disaster events.

This was perhaps best demonstrated in recent years as HUD has gradually assumed responsibility for the housing and support services for those Katrina victims still in need of assistance (State Disaster Plan).
Hurricane Timeline

1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014

Hurricane Katrina

1992
August
5 (156+ mph)
Aug. 16, 1992
Aug. 28, 1992

12 days
175 mph
922 mb
14 inches
$27 Billion
44 deaths
177,000 people
65,000 homes

2004
August
4 (131 - 155 mph)
Aug. 29, 2004
Aug. 15, 2004

6 days
145 mph
947 mb
10 inches
$1.5 Billion
15 deaths
80,000 people
15,000 homes

2004
September
3 (111 - 120 mph)
Sep. 5, 2004
Sep. 24, 2004
22 days
165 mph
910 mb
15 inches
$19 Billion
92 deaths
75,000 people
20,000 homes

2005
October
3 (111 - 120 mph)
Oct. 22, 2005
Oct. 24, 2005
11 days
185 mph
883 mb
15 inches
$21 Billion
23 deaths
70,000 people
16,000 homes

2005
September
2 (96 - 110 mph)
Aug. 1, 2005
Aug. 15, 2005
14 days
145 mph
935 mb
19 inches
$30 Billion
103 deaths
70,000 people
10,000 homes

2012
October
1 (74 - 95 mph)
Oct. 23, 2012
Oct. 30, 2012
8 days
105 mph
940 mb
21 inches
$6.5 Billion
199 deaths
200,000 people
40,000 homes

 Moreno, C.
Hurricane Relief Camps

Hurricane Andrew

An aerial view of the damage Hurricane Andrew left. The storm’s winds lifted roofs off of buildings and sank other boats.

Hurricane Charley

Charley tore apart whole communities of homes and businesses in Fort Myers Beach and Punta Gorda, Florida.

Hurricane Ivan

The storm surge along with its strong winds destroyed the bridge north of Pensacola, Florida.

Hurricane Wilma

Key West residents cross a flooded street with a canoe after Hurricane Wilma hit Florida’s southern west coast.

Hurricane Ike

The storm left a lot of debris throughout its path of destruction creating overwhelming conditions in Houston, Texas.

Hurricane Sandy

An amusement park on a pier in Seaside Heights, New Jersey washed out by Sandy on the New Jersey coast.

Tent City

"It’s to get families away from living along canals and floodplains... But is it only a temporary solution?"

Temporary Housing, Village

...Rain day one; these need to be communities with wrap-around services.

Congregate Shelter

"I’m not going to lie... If it wasn’t for RVs, I would have nowhere to stay, I’m very grateful for this little RV."

RV Camp

"I taught this house in kids. I’m worried about my property value... I can’t park it in front of my house, but they build it to hold up in my backyard."

Tolliver Park

Ashley, 21, Seaside Heights, New Jersey

In this tent sheltering

"I feel like we’re prisoners, it’s 80% a joke, but we honestly feel like we’re in a concentration camp."

Moreno, C.
RESEARCH TOPIC 2

CAMPS

HURRICANE KATRINA

FEMA ASSESSMENT

SAMPLE HOUSING UNITS

DESIGN PRECEDENT

- THE STORM
- THE AFTERMATH
- FEMA'S RESPONSE
  - FEMA Relief Camps
Hurricane Katrina started out as a tropical depression formed on August 23 about 200 miles south of the Bahamas. The following day it became Tropical Storm Katrina as it moved through the islands towards south Florida. Right before making landfall in Florida the storm became a hurricane the evening of August 25. Katrina strengthened significantly as it moved the Gulf of Mexico quickly becoming a Category 5 hurricane on August 28. At its peak the storm reached winds of 175 mph with a pressure of 902 mb about 200 miles south of the coast of Louisiana. The following day (August 29) Hurricane Katrina made landfall in Buras, Louisiana as a Category 3 hurricane. Winds averaged constantly at 87 mph with higher destructive gusts of winds every now and then reaching 120 mph and higher. Along the Mississippi and Louisiana coasts the storm surge flooding became a critical issue as it reached heights of over 20 feet. The storm surge proved to be too much force for the levees along the Mississippi River and Lake Pontchartrain as they gave way and buckled under the pressure. This was catastrophic for the city of New Orleans since it sits mostly below sea level. Just hours after making landfall, Katrina had made its mark on the city, leaving 80% of the metropolitan area under water. The Mississippi beachfront towns also fall victim to Katrina’s wrath, leaving 90% of these flooded with dragging vehicles and homes inland. The storm kept making its way north over Mississippi, Alabama and Tennessee as it dissipated into just a tropical low two days later by the eastern Great Lakes creating 33 tornadoes on the way. The amount of disaster and ruins that Hurricane Katrina left in its path made it the deadliest and most destructive Atlantic tropical cyclone of the Atlantic in 2005 (NHC).

Figure 7 - New Orleans under water after Hurricane Katrina (Mark Wolfe/FEMA)
THE AFTERMATH

AFTERMATH STATISTICS

- The death toll was at 1,836, primarily from Louisiana (1,377) and Mississippi (238) and 705 missing.
- The storm surge from Katrina was 20 ft (six meters) high.
- Hurricane Katrina affected over 15 million people.
- An estimated 80% of New Orleans was under water, up to 20 ft deep in places.
- Hurricane Katrina caused $81 billion in property damages.
- The total economic impact in Louisiana and Mississippi exceeds $150 billion, earning
- Hurricane Katrina impacted about 90,000 square miles.

The refugees that received aid from FEMA after Hurricane Katrina consisted of the following population:

- 14% were physically disabled
- 23% cared for a physically disabled person
- 22% were suffering from a chronic disease
- 55% did not have a car or a way to evacuate
- 68% had neither money in the bank nor a credit card
- 57% had total household incomes of less than $20,000
- 76% had children under 18 with them in the shelter
- 77% had a high school education or less
- 33% were unemployed

(CNN - Hurricane Facts)

Figure 6 - Destruction left by the storm and volunteers rushing to rescue any survivors in Baker, LA. (Mark Wolfe/FEMA)

Figure 7 - Aerial view of New Orleans flooded days after the hurricane stroke (Kyle Niemi/FEMA)
FEMA’S RESPONSE
The disaster recovery response to Hurricane Katrina included federal government agencies such as FEMA, non-governmental organizations, charities, and private individuals. Tens of thousands of volunteers and troops responded or were deployed to the disaster most in the affected area but also throughout the U.S. at shelters set up in at least 19 states. FEMA received a great deal of criticism in the press, from Congress, and from the accountability community concerning these health and safety issues, particularly formaldehyde levels. FEMA officials researched the causes of these problems and instituted corrective actions.

After Katrina the Bush Administration felt the pressure from the nation outraged at the recovery response. As a result Bush gave HUD responsibility for meeting the housing needs of people who have been caught in FEMA’s system for over 18 months. After these 18 months victim families are required to pay a portion of their rent each month, and the amount will increase by $50 with each payment. The National Low Income Housing Coalition (NLIHC) reported that it is pleased that HUD is taking over housing management from FEMA, but that assigning every family to the Section 8 voucher program would have been better. FEMA received a great deal of criticism in the press, from Congress, and from the accountability community concerning these health and safety issues, of these housing camps. In particular FEMA and the victims had issues with high formaldehyde levels. Another criticism was the housing units were inadequate to support a family for such a long period of time. Some units that were considered transitional shelter, like RV trailers, were instead used a long-term and temporary shelter; a function that they were not designed for (White House Archives). There was an estimated need for emergency housing for more than 100,000 people after the storm, requiring the rapid installation of more than 30,000 travel trailers and mobile homes. Although many temporary housing units were installed adjacent to the damaged homes, there was an estimated need for up to 5,000 units at “group sites” in the three southernmost counties of Mississippi.

At their peak, hurricane evacuate shelters housed 273,000 people and, later, FEMA trailers housed at least 114,000 households. Katrina damaged more than a million housing units in the Gulf Coast region, and displacing 770,000 people. In New Orleans alone there were 134,000 housing units that suffered damage from Hurricane Katrina and the subsidence due to flooding. Approximately $75 billion was spent by the government in emergency relief (CNN).

This map shows the location of all the Emergency Group Sites. Emergency Group Sites were built and operated by FEMA. These agreements/permits were time limited and tenuous and occasionally the cause of tension. In Long Beach, for example, officials refused to allow any more than a few, despite available land because officials were upset when FEMA placed residents from outside Long Beach and Pass Christian in the park on Avenue A. In Gulfport, some officials are seeking to revoke their permit for existence. Commercial Sites are simply groups of FEMA trailers or mobile homes on spaces rented by FEMA in existing commercial trailer or RV parks. The FEMA director for Mississippi’s Recovery Office, Sid Melton, said the priority is to empty the Emergency Group Sites before the Commercial Sites, in large part because they may lose permission to keep them filled. In Florida, after the 2004 hurricane season, FEMA sold many of their travel trailers and mobile homes to residents and municipalities in their commercial sites. All Emergency Group Sites are now gone (Kromm 2008).
D’IBERVILLE, MISS.,
December 10, 2005 – The FEMA D’Iberville Middle School Emergency Group Site (EGS) (background) and Temporary Apartment Complex (TAC) are used for temporary housing of residents displaced by Hurricane Katrina.
(Mark Wolfe/FEMA)

VIOLET, LA.,
December 16, 2005 – These FEMA travel trailers are being set up on East Judge Perez Drive in St. Bernard Parish just east of the Violet Canal. The site will be erected on the actual west-bound lanes of the highway and will affect approximately a one mile stretch of the roadway.
(Robert Kaufmann/FEMA)

PASS CHRISTIAN, MISS.,
October 30, 2005 – A FEMA temporary apartment complex (TAC), constructed in Pass Christian, is nearly ready for occupancy. FEMA is using a variety of methods to temporarily house Mississippi residents displaced by Hurricane Katrina.
(Mark Wolfe/FEMA)

BILOXI MS.,
October 4, 2005 – Emergency Temporary Housing Facility for disaster victims from Hurricane Katrina. FEMA is providing temporary emergency housing like these travel trailers in Biloxi.
(John Fleck/FEMA)

PASS CHRISTIAN, MISS.,
October 30, 2005 – A FEMA temporary apartment complex (TAC), constructed in Pass Christian, is nearly ready for occupancy. FEMA is using a variety of methods to temporarily house Mississippi residents displaced by Hurricane Katrina.
(Mark Wolfe/FEMA)

LONG BEACH, MISS.,
October 30, 2005 – A FEMA temporary apartment complex (TAC), constructed in Long Beach, is nearly ready for occupancy. FEMA is using a variety of methods to temporarily house Mississippi residents displaced by Hurricane Katrina.
(Mark Wolfe/FEMA)

BELLE CHASSE, LA.,
February 4, 2006 – Rows of FEMA provided travel trailers are installed in Plaquemines Parish for the temporary housing of the community’s displaced residents. Providing temporary housing in the disaster affected community enables the hurricane victims to be closer to home during the rebuilding process.
(Robert Kaufmann/FEMA)
Approximately 9,000 residents and 550 National Guardsmen sought shelter the Superdome as Katrina hit New Orleans. The number of people taking shelter in the Superdome rose to around 15,000 to 20,000 as search and rescue teams brought more people to the Superdome from areas hit hard by the flooding.

**SHELTER:**

Superdome was built to withstand most catastrophes; the roof was ostensibly estimated to be able to withstand winds with speeds of up to 200 mph; flood waters could still possibly reach the second level 20 feet from the ground, making the structure an unreliable shelter in severe rain and wind. On August 29, 2005, at about 9:00 AM EDT, reports from inside the Superdome were that part of the roof was “peeling off,” daylight could be seen from inside the dome, and rain was pouring in. Each about 15 feet long and 4 feet wide.

**AID:**

The National Guard delivered three truckloads of water and seven truckloads of MREs (meals ready to eat), enough to supply 15,000 people for three days. There was no water purification equipment on site, no chemical toilets, no antibiotics, and no anti-diarrheals stored for a crisis. There were no designated medical staff or work in the evacuation center, no established sick bay within the Superdome, and very few cots available that hadn’t been brought in by evacuees. The mayor of New Orleans had, in fact, stated that as a “refuge of last resort,” only limited food, water, and supplies would be provided. Residents who evacuated to the Superdome were warned to bring their own supplies. National Guardsmen accompanied by 475 and supply trucks arrived at the Superdome on September 1. The buses were sent to pick up the evacuees from the Superdome and the Ernest N. Morial Convention Center, where more than 20,000 people had been crowded in similarly poor living conditions. 13,000 evacuees were taken to the Reliant Astrodome in Houston. By September 4, the last large group from the Superdome had been evacuated (CNN).
Hurricane Katrina devastated far more residential property than had any other hurricane, completely destroying or making uninhabitable an estimated 300,000 homes. These were thousands of families that suddenly found themselves homeless and turned to FEMA for financial assistance and direct housing.

The installation of housing units at multiple locations was not possible because of the extensive destruction to the infrastructure and lack of access. In these cases, FEMA planned to cluster travel trailers and mobile homes in group sites. For the quickest deployment, travel trailers were placed in FEMA-designated Emergency Group Sites (EGSs) that were located on paved parking lots with aboveground utilities. The time from the start of design to occupancy was often less than 7 days for the EGSs. For emergency group sites required in areas without parking lots, or for larger group sites for longer occupancy (called Greenfield sites), the team faced all the typical site-preparation issues that any construction project would face.

During the initial recovery period of about 8 months, more than 31,000 housing units were installed in Mississippi, many in group sites that started with soft and wet soil conditions.

Work crews began three weeks of around-the-clock work to lay sewer and power lines and install more than 575 trailers on 62 acres north of Baton Rouge. Almost six weeks after Hurricane Katrina and two weeks after Hurricane Rita, FEMA opens Renaissance Village, one of more than 300 group trailer sites in Louisiana and by far the largest. Though Baker city officials approved and welcomed the site, the city’s Fire Department declares it will no longer answer calls in the park without compensation from FEMA. The agency eventually agrees to pay the city $400,000. By the same point, Rosie O’Donnell’s For All Kids Foundation commits $3 million to build a learning center at the park which FEMA initially denied access to.

By April it has been 18 months of FEMA assistance and officials announce the closure but a survey of remaining Renaissance Village residents finds more than 80 percent of households are below the poverty line. More than a third have no high school diploma, with 10 percent never completing eighth grade. Almost a third have some post-high school education. Two-thirds are unemployed. On second anniversary of Katrina, almost 500 trailers remain occupied. By March 2008 there were still over 150 families living in the park (Barrow 2008).
RESEARCH TOPIC 3

CAMPS

HURRICANE KATRINA

FEMA ASSESMENT

SAMPLE HOUSING UNITS

DESIGN PRECEDENT

SUMMARY

IA- TAC Contracts

DISASTER RELIEF CYCLE

Relief Housing Stages

Assistance Timeline
FEMA ASSOCIATION

FEMA supports an average of over 70 disasters per year in the United States, Territories, and Tribal Lands from 2005 to 2011. Approximately 40% of these disasters have included the authorization of Individual Assistance (IA) Programs. Hurricane Katrina is the largest disaster in recent history with a catastrophic magnitude that exhausted the available housing options. The disaster housing program provides for functional repair of damaged homes as well as financial and direct assistance for temporary housing. Forms of temporary housing provided for by Stafford Act programs may include roofing or other repairs to facilitate sheltering in place, tents and prefabricated housing units, relocation, direct rental and financial repair assistance paid to disaster survivors. Additionally, the Federal government may also provide resources that may include factory-built housing and converted commercial and publicly owned housing. In the implementation of the disaster housing mission within the State, the refugees needs will drive all operational decision making in the post-disaster environment.

The National Disaster Recovery Framework defines a catastrophic disaster as follows:

“Any natural or manmade incident, including terrorism, that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions” (About FEMA).

Emergency Response Laws

State and Municipal Laws

Federal Housing Laws

Uniform Federal Accessibility Standards (UFAS)
Section 504 of the Rehabilitation Act of 1973
National Fire Protection Association 301 A

The Americans with Disabilities Act
Section 504 of the Rehabilitation Act of 1973
National Fire Protection Association 301 A

Comprehensive Emergency Management Plan (CEMP)
Flood Prevention Ordinance
Comprehensive Plan and Land Development Regulations

Post-Disaster Redevelopment Plan (PDRP)
Uniform Federal Accessibility Standards (UFAS)
IA - TAC - Individual Assistance, Technical Assistance programs

The FEMA Individual Assistance (IA) Division provides financial and direct assistance to individuals and households in a disaster area whose property has been damaged or destroyed and whose losses are not covered by insurance. Direct assistance includes temporary housing, like travel trailers when rental properties or permanent housing is not available. In providing this assistance, FEMA can use local and small businesses or its Individual Assistance, Technical Assistance Contractors (IA-TACs).

FEMA policy is to use local vendors wherever feasible and practicable. When IA-TACs are used, the goal is to transition to local vendors within 6 months of the disaster event, and sooner if practicable. The contractors hired under these IA-TACs are responsible for providing comprehensive emergency management, project management, and program management services, as well as construction, architectural, and engineering capabilities in - Housing support, Construction services, Mass care, and Planning, staffing, and logistics services. (Office of Inspector General)

IA - TAC Sectors with FEMA Regions and Assigned Contractors

<table>
<thead>
<tr>
<th>Region</th>
<th>Assigned Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
<td></td>
</tr>
<tr>
<td>Region 2</td>
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<td>Region 3</td>
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<td>Region 5</td>
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<td>Region 6</td>
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<td>Region 7</td>
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<td>Region 9</td>
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<td>Region 10</td>
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<tr>
<td>Region 11</td>
<td></td>
</tr>
<tr>
<td>Region 12</td>
<td></td>
</tr>
</tbody>
</table>

![Map showing different FEMA IA-TAC Contract Sectors and the Region they are responsible for](Author_Year)

IA-TAC Deliverables

1. Sheltering (health/social services)
2. Feeding
3. Warehousing operations
4. Support camps
5. Temporary housing
6. Disaster planning
7. Pet care
8. Unaccompanied children
9. Commodities such as cats and blankets
10. Transportation of supplies
11. Staffing Support

Process for Requesting Federal Assistance
Disaster management cycle consists of four stages as shown by the adjacent diagram. As a whole the management cycle defines the stages towards recovery after a catastrophe has occurred. The phases in the cycle aim to reduce, or avoid, the potential losses from hazards in the aftermath of the disaster. It also ensures quick and appropriate assistance to victims of disaster, this means providing quick assessment and deploying the needed assistance to achieve rapid and effective recovery. The Disaster management cycle illustrates the ongoing process by which our governments plans for to reduce the impact of disasters. The government react during and immediately following a disaster, and also take steps to recover after a disaster has occurred. Appropriate actions at all points in the cycle lead to greater preparedness, better warnings, reduced vulnerability or the prevention of disasters during the next iteration of the cycle. The complete disaster management cycle includes the implementation of policies and laws that mitigate their effects on people, property, and infrastructure. Such assistance may range from providing specific but limited aid, such as assisting refugees with transport, temporary shelter, and food, to establishing semi-permanent settlement in camps and other locations. Part of the cycle also includes assistance in home repairs. The first stage, mitigation, attempts to minimize the possible effects of the disaster. Preparedness consists of the immediate reaction to the crisis. The response includes all type of aid administered after the disaster and recovery is achieved when the community returns to normal (Warfield 2014).

EXAMPLE OF CYCLE OBJECTIVES

- Minimize the potential risks by developing disaster early warning strategies
- Prepare and implement development plans to provide resilience to such disasters
- Mobilize resources including medical
- Disaster management, on the other hand involves:
  - Pre-disaster planning, preparedness, and monitoring including relief management
  - Prediction and early warning strategies
  - Damage assessment and relief management
- Systemic plan of disaster reduction
- Distributes emergency supplies (i.e. personal care kits, clean-up kits)
- Provides for feeding victims and emergency workers at both stationary and fixed sites
- Responds to disaster welfare inquiries and provides information services and emergency financial assistance for food, clothing, medical needs, temporary home repairs, occupational supplies, and other essentials on an individual or family basis (Warfield 2014).
In camping, siting involved strategic planning of choosing a site as well as the resulting analysis of how to prepare for the event. This phase is the disaster recovery cycle is the siting of the possible solutions to the recovery process. It encompasses the early stages of the planning process in which the possible solutions are predicted and allotted efficient response plans. Like siting, this process marks the beginning of the camping experience and it is the foundation of the recovery process. This stage is important because if the proper protocols are to be implemented as soon as a disaster strikes, the response time could be significantly quicker. Faster response times minimize casualties and develop early response procedures like mobilizing critical resources and allocating relief sites.

For FEMA, mitigation involves the thorough analysis of the plausible risks beforehand to determine solutions prior to the problems. Clearing in camping is focused on obtaining the resources available and assessing the sheltering need and the available relief support. It encompasses the stages of the planning process in which the possible situations are predicted and allotted efficient response plans. For FEMA, this means defining the solutions to different outcomes, delineating what is the extent of the aid need in order to be prepared to respond immediately and also the implementation of evacuation and deployment of emergency sheltering.

The making or response stage is the actual housing assistance and it encompasses all the transitional sheltering stage and the temporary housing stage. Once the permanent housing stage has been reached, it is assumed that recovery has also been achieved and so the breakdown of the camp occurs. This breakdown or closing takes place one camp of necessity ceases to exist once the housing need of the refugees has been met.

When control and autonomy are in balance there is no necessity for a camp anymore. At this point the victim will either move back into their fixed home, move away to a new home, or remain in the temporary housing assistance unit and develop it into permanent housing. The decision of permanently staying changes the idea of the camp because instead of having a definite existence and being a transitory space, it becomes the permanent settlement and different needs arise that need to be addressed with more long-term considerations.

Four main objectives of recovery:
1. Long-term and short-term housing
2. Financing for housing repairs and recovery
3. Community support services
4. Infrastructure recovery
Relief Housing Stages

Emergency Sheltering

These facilities are often uncomfortable spaces with few amenities and are sparingly provisioned. This stage also provides facilities for individuals and families whose homes were damaged to the extent that they are no longer habitable. These usually exist for several days to two weeks, depending on how long it takes to find more normal living arrangements. These facilities have adequate sanitation facilities and provide sleeping spaces for a few hundred people at a time. Sometimes these are indoor facilities or tent cities (Hall 2014).

Transitional Sheltering

This sheltering stage is needed for victims housed or flown to temporary shelters in other states uncertain when/if they will be able to return. These must provide long-term services for the hurricane/flood victims. It is currently unknown how many residents who evacuated still need long-term sheltering; however, it should be assumed that most of them have lost their homes and their jobs, making them delayed victims of the hurricane. Victims do not necessarily progress in a linear fashion through the four sheltering phases (Hall 2014).

Temporary Housing

This stage of sheltering is for victims who still cannot return to their damaged homes but are in need of local lodging so that they can return to their normal functions and tasks. These housing options are usually apartments or rental homes that evacuate use for several weeks to several years until victims can return to their original repaired or totally rebuilt homes. FEMA has frequently made mobile homes available as temporary housing options, either situating a trailer on a property owner's lot or in mobile home parks that are in the vicinity of the damaged neighborhoods (Hall 2014).

Permanent Housing

Permanent housing is necessary when victims will never be able to return to their original homes. This stage is intended to help the families whose homes have been permanently destroyed by providing them with housing while they make the necessary arrangements and find other permanent lodging or help them obtain permanent housing directly. This occurs when the owners of properties decides to either not rebuild or rebuilds the units but at a higher cost dwellings than the victims can afford; or the victim is the owner of their home and the damage is so severe that they cannot afford to rebuild their homes. If the vacancy rate in the disaster-affected area is low, disaster victims may need to relocate to other cities (Hall 2014).

Duration of Housing Stages

- **Emergency Sheltering**
  - Intended for immediate assistance and evacuations
  - 0 - 21 days

- **Transitional Sheltering**
  - Intended for refugees who have been displaced for a short period of time
  - 10-60 days

- **Temporary Housing**
  - Intended for refugees with severely damaged or destroyed home
  - 2-18 months

- **Permanent Housing**
  - Intended for refugees who have been left homeless
  - 18 + months
The diagram illustrates the Assistance Timeline for disaster recovery and restoration. It categorizes the types of damage and repair, as well as the different stages of recovery:

- **Preparedness**: Types of Damage and Types of Repair
- **Response**: Housing Needs
- **Recovery**: Financial Assistance and Direct Assistance
- **Mitigation**: Direct Assistance
- **Disaster Strikes**: Financial Assistance and Direct Assistance
- **Restoration**: Financial Assistance and Direct Assistance

The timeline includes:
- **Emergency Shelter**
  - Direct Assistance: Pre-existing Shelter Facilities (40 days)
  - Direct Assistance: Large Venue Sheltering (30 days)
  - Direct Assistance: Soft sided Survivor Support Camps (40 days)
  - Direct Assistance: Relief Aid Centers (30 days)
  - Direct Assistance: Distribution Points (30 days)
  - Direct Assistance: Medical Assistance (30 days)
  - Direct Assistance: Household Part Shelter (30 days)

- **Transitional Housing**
  - Financial Assistance: Hotel/Hotel (30 days)
  - Direct Assistance: Social Services Shelter (30 days)
  - Direct Assistance: Temporary Conveyances (180 days)
  - Direct Assistance: Vacant Building (120 days)
  - Direct Assistance: Warehouse Facilities (60 days)
  - Direct Assistance: Self-Released Sheltering (60 days)
  - Direct Assistance: Cruise Ships (180 days)

- **Temporary Housing**
  - Financial Assistance: Emergency Assistance (18 months)
  - Financial Assistance: Rent Assistance (18 months)
  - Financial Assistance: Homeowner Assistance (18 months)
  - Direct Assistance: Temporary Conveyances (18 months)
  - Direct Assistance: Rent Assistance (18 months)
  - Direct Assistance: Homeowner Assistance (18 months)

- **Permanent Housing**
  - Direct Assistance: Modular Homes (18 months)
  - Direct Assistance: Prefab/Modularized Homes (18 months)
  - Direct Assistance: Construction Kit/Homes (18 months)
  - Direct Assistance: Remodel/Rebuild (18 months)
  - Direct Assistance: Rebuild/Replace (18 months)
  - Direct Assistance: Reinstate/Refurbish (18 months)
RESEARCH TOPIC 4

- CAMPS
- HURRICANE KATRINA
- FEMA ASSESSMENT
- SAMPLE HOUSING UNITS
- DESIGN PRECEDENT

- OVERVIEW
- UNIT COMPARISON
  - Matrix Comparison
- STANDARD UNIT TYPES
The following study investigates all the traditional housing units FEMA implements as direct assistance under the Individuals Assistance program. Most of the units are either implemented in private lots or as part of larger commercial sites. These are normally installed either by military personnel or by private contractors that FEMA hires under the previously mentioned IA-TAC Contracts.
<table>
<thead>
<tr>
<th>Type of Housing</th>
<th>Unit Kind</th>
<th>Accommodates</th>
<th>Sq. Ft.</th>
<th>Cost</th>
<th>Dimensions W</th>
<th>Dimensions L</th>
<th>Dimensions H</th>
<th>Weight</th>
<th>Initiation</th>
<th>Operational</th>
<th>Timeline</th>
<th>Const. Rate</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Venue Sheltering</td>
<td>Large Housing Tents</td>
<td>5,000 max.</td>
<td>1,800 sq. ft.</td>
<td>$5,000.00</td>
<td>3'2'</td>
<td>6'7'</td>
<td>1'5'</td>
<td>500 lbs</td>
<td>7 days</td>
<td>10 days</td>
<td>1-3 days</td>
<td>-</td>
<td>60 days</td>
</tr>
<tr>
<td>Soft-sided Survivor Camps</td>
<td>Military Cot</td>
<td>11,000 max.</td>
<td>40 sq. ft. per person</td>
<td>$605</td>
<td>5'</td>
<td>8'2'</td>
<td>1'5'</td>
<td>-</td>
<td>1 day</td>
<td>8 days</td>
<td>1 day</td>
<td>-</td>
<td>30 days</td>
</tr>
<tr>
<td>Distribution Centers</td>
<td>Shipping Containers</td>
<td>2,400 cu. ft.</td>
<td>320 sq. ft.</td>
<td>$2,000.00</td>
<td>8'</td>
<td>4'7'</td>
<td>8'6&quot;</td>
<td>9,000 lbs.</td>
<td>2 days</td>
<td>5 days</td>
<td>1 day</td>
<td>-</td>
<td>30 days</td>
</tr>
<tr>
<td>Soft-sided Sheltering</td>
<td>Military Tents</td>
<td>4 - 8 people</td>
<td>192 sq. ft.</td>
<td>$700.00</td>
<td>12'</td>
<td>1'6&quot;</td>
<td>1'0&quot;</td>
<td>140 lbs.</td>
<td>2 days</td>
<td>17 days</td>
<td>1 day</td>
<td>-</td>
<td>30 - 90 days</td>
</tr>
<tr>
<td>Soft-sided Sheltering</td>
<td>UNHCHT Tent</td>
<td>3 - 6 people</td>
<td>180 sq. ft.</td>
<td>$600.00</td>
<td>18'</td>
<td>1'0&quot;</td>
<td>8'0&quot;</td>
<td>110 lbs.</td>
<td>2 days</td>
<td>17 days</td>
<td>1 day</td>
<td>-</td>
<td>31 - 90 days</td>
</tr>
<tr>
<td>Recreational Vehicle</td>
<td>Airstream</td>
<td>2 - 3 people</td>
<td>144 sq. ft.</td>
<td>$20,000.00</td>
<td>8'</td>
<td>1'8&quot;</td>
<td>8'0&quot;</td>
<td>3,000 lbs.</td>
<td>3 days</td>
<td>10 days</td>
<td>1 day</td>
<td>-</td>
<td>180 days</td>
</tr>
<tr>
<td>Travel Trailers</td>
<td>Rietveld - Pioneair</td>
<td>2 - 3 people</td>
<td>180 sq. ft.</td>
<td>$30,000.00</td>
<td>9'</td>
<td>2'0&quot;</td>
<td>8'0&quot;</td>
<td>3,800 lbs.</td>
<td>7 days</td>
<td>35 days</td>
<td>2-3 days</td>
<td>100 units per week</td>
<td>18 months</td>
</tr>
<tr>
<td>Park Model Trailer</td>
<td>Antel Modular</td>
<td>2 - 5 people</td>
<td>396 sq. ft.</td>
<td>$40,000.00</td>
<td>1'2&quot;</td>
<td>3'3&quot;</td>
<td>10'0&quot;</td>
<td>-</td>
<td>7 days</td>
<td>50 days</td>
<td>7 days</td>
<td>50 units per week</td>
<td>18 months</td>
</tr>
<tr>
<td>Manufacturing Homes</td>
<td>Clayton Homes</td>
<td>2 - 6 people</td>
<td>840 sq. ft.</td>
<td>$48,000.00</td>
<td>1'4&quot;</td>
<td>6'7&quot;</td>
<td>10'0&quot;</td>
<td>-</td>
<td>7 days</td>
<td>70 - 90 days</td>
<td>10 days</td>
<td>75 units per week</td>
<td>18 months</td>
</tr>
<tr>
<td>Kahina Cottage</td>
<td>MarianneCuato</td>
<td>1 family</td>
<td>352 sq. ft.</td>
<td>$58,000.00</td>
<td>1'6&quot;</td>
<td>22'0&quot;</td>
<td>10'0&quot;</td>
<td>-</td>
<td>1 day</td>
<td>40 days</td>
<td>10 days</td>
<td>30 units per week</td>
<td>18 months +</td>
</tr>
<tr>
<td>Modular Homes</td>
<td>Bouhu Modular</td>
<td>1 family</td>
<td>440 sq. ft.</td>
<td>$55,000.00</td>
<td>22'</td>
<td>20'0&quot;</td>
<td>10'0&quot;</td>
<td>-</td>
<td>2 days</td>
<td>50 days</td>
<td>14 days</td>
<td>125 units per week</td>
<td>18 months +</td>
</tr>
<tr>
<td>Prefab/Paneled Homes</td>
<td>Craven Construction</td>
<td>1 family</td>
<td>1,100 sq. ft.</td>
<td>$62,000.00</td>
<td>28'</td>
<td>40'0&quot;</td>
<td>16'0&quot;</td>
<td>-</td>
<td>1 day</td>
<td>35 days</td>
<td>15 days</td>
<td>14 units per week</td>
<td>18 months +</td>
</tr>
</tbody>
</table>
Emergency Sheltering

Survivor Shelter Camps

- Type: Large Frame Tent
- Dimensions: 30' x 60' x 18'
- Size: 1,800 sq. ft.
- Capacity: 30 people
- Cost: $5,000.00

Large Venue Sheltering

- Type: Standard Travel Cot
- Dimensions: 3’ x 7’ x 1.5’
- Size: 40 sq. ft.
- Capacity: 1 person
- Cost: $60.00

Distribution Centers

- Type: Shipping Container
- Dimensions: 8’ x 6’ x 40’
- Size: 300 sq. ft.
- Capacity: 2,400 cu. ft.
- Cost: $2,000.00

Contracts or other Federal agencies will set up, operate, manage, and maintain shelters utilizing “self-sided” facilities (tents, sprung structures, other temporary structures). Capable of housing a maximum of 5,000 disaster survivors, per site. Services to be provided include sleeping area (40 sq. ft. per person), feeding, sanitation, recreation, access and functional needs, casework, child care, and sheltering and support for household pets and service animals.

Colleagues, stadiums, and sports arenas, usually called "mega-shelters," are used when sufficient personnel, equipment, supplies, and resources are available to support this scale operation. Facilities have been used to shelter up to 11,000 survivors. Capacity is based on 40 sq. ft. per person for evacuation and 40 sq. ft. per person for post-evacuation. Congregate sheltering operations require large number of staff, supplies, and equipment that may be used for recovery.

A shipping container is a container with strength capable to withstand shipment, storage, and handling. Shipping containers range from large reusable steel boxes used for intermodal shipments to the ubiquitous corrugated boxes. FEMA uses these shipping containers as their main mode of transportation to deploy via air, sea or land, the necessary relief items to the victims. These are also used often as a modular unit for emergency relief housing.
Transitional Sheltering

Military Tents

- Type: Military MS Tent
- Dimensions: 12' x 16' x 11'
- Size: 192 sq. ft.
- Capacity: 4 - 8 people
- Cost: $700.00

UNHCR Refugee Tent

- Type: UNHCR Tent
- Dimensions: 18' x 10' x 8'
- Size: 180 sq. ft.
- Capacity: 3 - 6 people
- Cost: $600.00

Recreational Vehicle

- Type: Airstream RV
- Dimensions: 8' x 16' x 8'
- Size: 144 sq. ft.
- Capacity: 2 - 3 people
- Cost: $20,000.00

In-Place Sheltering:
Distribution of tents, camping kits, equipment, and supplies to households will allow survivors to remain on their property and shelter-in-place. Unknown. Depending on availability, access and transportation of tents, equipment, and supplies. Limited national stock for "heavy use"livable single family tent will limit the use of this option. Estimated "CONUS" inventory is less than 10,000. USFS fire cache tents may also be an option.

Soft-sided Sheltering:
Initial shelter operations are established by local and State government to provide a safe and secure environment for survivors. This option is a short-term solution for survivors displaced from their homes and not intended as a housing solution. Substantial but will be limited by availability of sites and availability of tents. Camps should not exceed 5,000 survivors per site. A camp requires a minimum of 25 acres.

Recreational Vehicles:
Recreational vehicles leased from vendors can be used for transitional housing. Leasing/purchase contracts through PAS Transportation Management (PSA). There were over 45,000 RVs installed nationwide in 2007. Limiting factors are distance from the affected area and competition from responders and contractors for the use and set-up of the RV camps. Several large rental companies may have stock that could be leased.
Temporary Housing

Travel Trailers are designed to provide temporary living quarters for recreational purposes. They are not regulated by HUD. FEMA told us that it decided to terminate the use of travel trailers in response to formaldehyde concerns following Hurricanes Katrina and Rita. FEMA now does not consider such units appropriate for long-term use as a dwelling. Travel trailers are required to incorporate a 100 ampere electrical service.

Park Model Trailers

Park models are 12 feet wide and 33 feet long. They are transportable, primarily designed for long-term or permanent placement, and are not regulated by HUD. Park models are designed to provide temporary living quarters for recreation, camping, or seasonal use, and some zoning laws provide more flexibility in their placement. Built on a single chassis, mounted on wheels and has a gross trailer area not exceeding 400 square feet.

Manufactured Homes

Manufactured housing units are 12 to 14 feet wide and 40 to 64 feet long. They are regulated by HUD and are intended for permanent housing, with some zoning laws restricting their placement. Because of their size and some State/local zoning limitations, the HUD-certified units cannot be used on some private sites unless FEMA takes action to reduce the size of the units. This decision will force FEMA to place units at the more expensive commercial and group sites.

Travel Trailer

Type: Fleetwood Pioneer
Dimensions: 9' x 20' x 8'
Size: 180 sq. ft.
Capacity: 2 - 4 people
Cost: $30,000.00

Park Model Mobile Home

Type: Ariel Modular
Dimensions: 12' x 33' x 10'
Size: 390 sq. ft.
Capacity: 2 - 5 people
Cost: $60,000.00

Manufactured Homes

Type: Clayton Homes
Dimensions: 14' x 60' x 10'
Size: 840 sq. ft.
Capacity: 2 - 6 people
Cost: $48,000.00
Permanent Housing

Katrina Cottages
- Type: Marianne Cusato
- Dimensions: 16' x 22' x 10'
- Size: 352 sq. ft.
- Capacity: 1 couple
- Cost: $58,000.00

Modular Homes
- Type: Boulu Modular Homes
- Dimensions: 22' x 28' x 10'
- Size: 440 sq. ft.
- Capacity: 1 couple
- Cost: $55,000.00

Pre-fab/Panelized Homes
- Type: Craven Construction
- Dimensions: 28' x 40' x 16'
- Size: 1,100 sq. ft.
- Capacity: 1 family
- Cost: $62,000.00

Katrina Cottages
A Katrina Cottage is a small house permanent house, which is safe, affordable and can be assembled quickly. Architect and planner, Andres Duany developed the concept for the Katrina Cottage soon after Hurricane Katrina. The first four plans lower’s intends to offer its customers range from 544 square feet to 936 square feet. Some of the plans are designed to grow as large at 1,200 square feet, though a limited number of additional designs of 1,340 square feet are forthcoming.

Modular Homes
Modular temporary housing units are composed of structural modules, pre-constructed at a manufacturing site, and joined on site. FEMA has active contracts with vendors which include installation. FEMA is aware of 50 + additional vendors not currently under contract. Modules can be complete units with pre-installed wet units, or be more component-focused (for example, separate living space, bathroom, and kitchen “modules” which are combined to create a complete unit).

Pre-fab/Panelized Homes:
Panelized temporary housing units are composed of pre-made wall, floor, and roof sections that are assembled into a structure on-site. Panelized units require more construction on-site than modular units. FEMA has collected evaluative data on several temporary housing units. Units that have not been evaluated may only be in the design phase and might not be practicable or meet FEMA standards for disaster housing. FEMA currently has an active contract with a vendor (CRN).
RESEARCH TOPIC 5

- CAMPS
- HURRICANE KATRINA
- FEMA ASSESSMENT
- SAMPLE HOUSING UNITS

DESIGN PRECEDENT

- CASE STUDY 1
- CASE STUDY 2
- CREATIVE SOLUTIONS
CASE STUDY 1 - KATRINA COTTAGE

In 2006 Congress provided a $400 million special appropriation to FEMA to identify and evaluate better ways to house future disaster victims while also assisting those impacted by the 2005 hurricane season. In response, FEMA developed the Alternative Housing Pilot Program (AHPP) as a competitive grant program and invited the Gulf Coast States to submit innovative proposals. Five projects of the 29 submitted were awarded to four states. Two projects were awarded to Mississippi and one each to Alabama, Louisiana and Texas (Alternative Housing Program 2009).

ALABAMA + MODULAR
City of Bayou la Batre
Community Development
- 2 - 4 Bedroom Layouts
- Expandable
- Deployable and Permanent

LOUISIANA + SITE-BUILT
Louisiana Recovery Authority (LRA)
Temporary and Permanent
- Steel Framing
- In-fill and Group Sites
- Single and Multi-Family

MISSISSIPPI + MANUFACTURED
Mississippi Emerg. Mgrnt. Agency
2 Unique Projects
- Individual and Group Sites
- Multiple Jurisdictions
- Temporary and Permanent

TEXAS + PANELIZED
Dept. of Housing & Community Affairs
Prefabricated and Expandable
- Storeable for Future Reuse
- Assembles in Under 10 Hours
- Deployable and Permanent
CASE STUDY 2 - VIVIENDA RURAL

Maria Asuncion Marquez – Retired architect that worked for the Urban and Regional Department in Venezuela. Her work, “Vivienda Rural”, focused on providing affordable housing solutions for lower income families in the poorest sectors in the country that were often affected by mudslides. The displaced families needed “cheap fixes” that utilized local materials.

SAMPLE UNIT CONSISTED OF:

- Foundation and Base Plate: Poured Concrete
- Walls: concrete blocks
- Roof Support: Wooden Beams
- Roof Structure: Wave sheet metal
- Fiber-cement: Eternit or Mexal!

Typical floor plan consisted of 2 – 3 rooms and could be occupied by a single family or groupings of single individuals. Conjoined units (as shown below) were often built to keep costs down. As shown in the sketches, the units were designed with windows to maximize natural lighting. Electricity is unreliable in these rural areas and lighting became a crucial element in the design.

Roofing design became another crucial element of the design of these units because of the need for it to resist filtration water into the interior. The region is known for its frequent downpours. The main structural element of the roofing structure was a wooden beam that supported the metal sheets. The sheets were precut to different sized panels and connected together with self-tapping screws. The overlapping of the panels is important to waterproof the structure. The most crucial element of the roofing is the securing of the sealing panel piece that covers the joint of both sides. Each piece of this element was fastened at all corners after the placing of the roofing metal panels (Maria Asuncion 2014).
The Almost Home Shelter solves a growing need for temporary dwellings to protect people who have lost homes in earthquakes, hurricanes, tsunamis and more. Two major obstacles are money and storage, and this concept by Katrina Oppenheimer challenges both.

Costs are reduced by manufacturing standard parts for these compact, rectangular residences and leaving the task of assembling them to the survivors of the natural disaster. This way, abodes for entire communities can remain tightly packed and readily assembled before and between uses, and once each family is settled, a mobile shelter can be loyally customized to the individual family's requirements (In Habitat).

The purpose of the 3D printed house was to make it as passable and durable as possible for people to use as a temporary dwelling. This initiative started with the intention to accommodate military troops when they are deployed overseas. These units require durable and strong materials that are lightweight and easily manageable. Scientists and engineers recently developed a new product, a three-dimensional engineered fiberboard (3DEF) that once commercialized, this material can be made in large sheets designed to serve as prefabricated wall, floor, and roof. These prefabricated units could be easily transported and quickly assembled into lightweight shelter structures (USD).

SpaceMax sets the new global standard for mobile deployable shelter. Utilizing highly advanced, proprietary and patent-pending technologies, SpaceMax provides a light weight, highly mobile shelter that can be deployed in minutes anywhere in the world. SpaceMax shelters provide new levels of quality safety, energy efficiency, longevity, and ease of use resulting in reduced risk, an increase in ROI and higher mission effectiveness. SpaceMax expandable shelters combine a rigid core framed by steel, with a fold-out panel system that is deployed by 2 to 4 people, with as few as 6 easy steps in under 5 minutes. SpaceMax shelter can be deployed in a fully functional state faster than any other mobile shelter (SpaceMax).

As a transitional shelter it is intended to be a temporary response to a crisis. The shelter can be assembled by two adults in six hours with only common tools and a cardboard diagram. It is designed to house a family of five for up to five years during the post-disaster reconstruction phase and then can be upgraded, refurbished or recycled. The interior area is 18 sqm, designed to comply with the accepted standard of 3.5 sqm per inhabitant in refugee housing. The interior contains two separate sleeping spaces, a gallery kitchen and a small separate eating/ living/work space. A kit over the sleeping areas can be used as additional sleeping area or storage. There is an additional seven square meters of covered exterior space meant to serve multiple functions for the inhabitants during their occupancy period (In Habitat).
Tempo Housing

Tempo Housing has 7 base models. What they have in common is that they are ducts and pipes for ventilation, sewage, water and heating/cooling and the wiring for power and data all come together in a central service shaft in the middle of the unit. This element of the design allows for modularity and reconfiguration of the living space.

The design of this example also included:
  - Internal insulation
  - Large windows for sufficient daylight
  - Steel construction for high stacking.

(Tempo Housing)

Uber Shelter

This is a portable housing unit that would help people in meeting their immediate shelter requirements created by disastrous events. This shelter can be very quickly transported and reassembled easily and offers victims with individual living space. It is made from recyclable and reusable materials and around two to three personal rooms can be created in this shelter. I believe these types of concepts are very useful for unpredictable disasters (Halti, Pihl 2011).

Kramer Maker

It’s A 3D printer that can print anything by providing the right materials and instructions.

(S.H.R.I.M.P.)

SHRIMP is an attempt to bring housing relief to large numbers of displaced or homeless people. This is a proposed solution currently for the victims of natural disaster. The design of S.H.R.I.M.P. provides shelter to a family of four. The structure folds up into 1/4 of a shipping container for efficient deployment and easier transportation. Once full container setup would be equivalent to 100,000 housing units for one shipment. Even though I have not further looked into this design and seen the actual images of it, I particularly was interested in the fact that they used techniques that addressed issues of resource scarcity (clean water sources) and the structural ability of setting these up on areas where the ground stability may be in question (Wright, 2016).

(TOUAX Global)

TOUAX is a global corporate services provider, specializes in the operational leasing and sale-of-shipping containers, modular buildings, freight racking, and office buildings. The manufacturer offers a range of temporary and permanent solutions from a box converted to a personalized luxury line of modular constructions. The solution is based on a light steel framing system with wall panels that can be interchanged. Some lines are also based on shipping container modules (TOUAX).

Product lines:
  - Budget
  - Economy
  - Standard
  - Performance
  - Design

(Edv - 01)

This high-tech shelter is the size of a shipping container.

Moreno, C.

UF G 1664 Masters Research Project
DESIGN PROPOSAL

DESIGN PROPOSAL

EVOLUTION OF SHELTER
DESIGN PROPOSAL

DESIGN CONCEPT

EVOLUTION OF SHELTER

- Assembly
- Program
The proposed solution will attempt to balance the benefits of minimizing construction costs and the often negative impacts that these cost-cutting choices may have on the long-term performance and efficiency of the dwelling. The project will also focus on the transition from temporary housing to permanent housing and defining the threshold of the final housing stage. The design aims to shorten the process of implementation and construction because it is based on a modular system that can grow with each housing stage and evolve to meet the needs of the victims as time goes on and their personal recovery cycle develops. Right after the disaster strikes and victims are left homeless, their needs are basic shelter, food and access to sanitation facilities. Later on, they will develop to include independe, access to transportation, recreational space and other amenities. The modular system intends to be flexible enough to adapt to the different needs at each of the four housing stages (i.e. emergency sheltering, transitional housing, temporary housing, and permanent housing). The proposed solution addressed the development of the Renaissance Village, a FEMA Group Site in Baker County, LA. The developed design tracks the evolution of the system both at the large community scale and the single family unit scale. The solution also addresses the transition from temporary housing to permanent housing and how it relates to the recovery of the family.

The purpose of this research is to identify the most appropriate mass-produced architecture to be implemented in the aftermath of a natural disaster. The remediation efforts to address temporary and permanent housing often do not meet needs. The objective of this research is to evaluate the housing models currently being deployed in disaster regions. In addition, this research identified characteristics that are essential to the construction of an architecture that can be deployed during a disaster. This was achieved by analyzing previous deployed models during Hurricane Katrina with a select group of case-study housing techniques. The identified characteristics developed into a matrix for the design and construction of rapidly deployable post-disaster housing. In the wake of a disaster, local and state governments and charitable organizations take immediate steps to shelter families and individuals whose housing has been made uninhabitable by the disaster event. Various stages of sheltering and housing assistance occur in the cycle of aid. Federal assistance often does not come early in this cycle, if at all. While on average there have been about 30 disaster declarations per year, in many instances, federal help is not required or available. This research proposes that a site comprehensive evaluation strategy is required to support the multiple design and implementation stages particular to each disaster and its victims.

Proposal is based on the concept of shelter evolution.

Martin Heidegger
Buon, means to dwell. This signifies: to remain, to stay in a place. But if we listen to what language says in the word bauen we hear three things: 1. Building is really dwelling. 2. Dwelling is the manner in which mortals are on the earth. 3. Building as dwelling unfolds into the building that cultivates growing things and the building that erects buildings.

Le Corbusier
A house is a machine for living.

AIM OF DESIGN
- Transition from temporary to permanent
- Define shelter, home, house, dwelling
- Minimize disruptions in victim recovery

Transition from Shelter to Permanent Home:
1. Components cannot be easily interchangeable
2. Permanently situated on context
   - Foundations
   - No longer self-sustaining
   - Oriented specifically for site
   - Aesthetically relevant to surroundings
3. Personalized plan and program
   - Based on family hierarchy and structure
   - Single-use rooms
   - Separation of shared living spaces and private quarters
4. Must dwell in home
   - Owner must work for and earn their livelihood
   - Pride in home and ownership
   - Re-gaining a home is a catalyst for personal recovery
   - Crucial for socio-economic rehabilitation
5. Ability to grow
   - Home must retain ability for future development
   - Building the unfinished
CONCEPT OF ASSEMBLY

Three Types of Modules

FM – Frame Modules

RM – Room Modules

AM – Accessory Modules

Assembly Sequence

Components:
- Frame
- Enclosure
- Covering
- Roof
- Foundation
- Windows and doors
- Utilities/Infrastructure
- Standard Floorplan
- Outdoor Space
- Personalized Floorplan
- Permanent Structure
- Finished Materials

Design is based on the evolution of refugee sheltering in other parts of the world.
Assembly by Structure

Based on Maslow’s hierarchy of needs and interpreted as each of the housing stages. The understanding is that victims needs change and evolve as they undergo the disaster relief cycle. The diagram shows the pyramid of needs and how I interpreted the needs of the victims at each housing phase to scale up a level in the pyramid every time in enters a new stage.

Assembly Sequence

- PHYSIOLOGICAL
- SAFETY AND HEALTH
- LOVE AND BELONGING
- ESTEEM
- SELF - ACTUALIZATION

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) Camp

- F3 - Future Housing
- PH - Permanent Housing
- TH - Temporary Housing
- TS - Transitional Sheltering
- ES - Emergency Sheltering
DESIGN CONCEPT

EVOLUTION OF SHELTER

- Emergency Shelter
- Transitional Shelter
- Temporary Housing
- Permanent Housing
Emergency Sheltering 0 - 2 weeks

Overall Camp fits 180
Each Tent fits 40 people and 5 disabled

Survivor Shelter Camps:
Contractors or other federal agencies will set up, operate, manage, and maintain shelters utilizing “soft-sided” facilities (tents, sprung structures, other temporary structures). Capable of housing a maximum of 5,000 disaster survivors, per site. Services to be provided include sleeping area (60 sq. ft. per person), feeding, sanitation, recreation, access and functional needs, casework, child care, and sheltering and support for household pets and service animals.
Proposed Community Site

Scale 1/32" = 1' - 0

One acre
Lot Size 136' x 340'

Initial Parcel size of 34' x 55'
Accommodating 20 units (60 people)

Soft-sided Sheltering:

Initial shelter operations are established by local and State government to provide a safe and secure environment for survivors. This option is a short term solution for survivors displaced from their homes and not intended as a housing solution. Substantial but will be limited by available sites and availability of tents. Camps should not exceed 5,000 survivors per site. A camp requires a minimum of 20 acres.
Proposed Community Site

Scale 1/32" = 1' - 0"

One acre
Lot Size 136' X 340'
Initial Parcel size of 34' x 55'
Accommodating 20 units (60 people)

Park Model Trailer:
Park models are 12 feet wide and 33 feet long. They are transportable, primarily designed for long-term or permanent placement, and are not regulated by HUD. Park models are designed to provide temporary living quarters for recreation, camping, or seasonal use, and some zoning laws provide more flexibility in their placement. Built on a single chassis, mounted on wheels and has a gross trailer area not exceeding 400 square feet.
Proposed Community Site

One acre
Lot Size 136 ’ X 340’
Parcel size of 68 x 55’
Accommodating 10 units (45 people)

Katrina Cottage
A Katrina Cottage is a small house permanent house, which is safe, affordable and can be assembled quickly. Architect and planner, Andrés Duany developed the concept for the Katrina Cottage soon after hurricane Katrina. The test four plans Lowe’s intends to offer its customers range from 544 square feet to 936 square feet. Some of the plans are designed to grow as large as 1,200 square feet, though a limited number of additional designs at 1,340 square feet are forthcoming.
DESIGN CONCERNS

1. Durability and disaster resilient
Architects do not always get to select a safe, hazard free site, but as an architect it is important to design with those hazards in mind. The design must be able to provide refuge from, and adapt to extreme weather conditions, including high winds, damaging hail, coastal flooding or subtle mudslides.

2. Cost effectiveness
Sustainability, resilience, and affordability are conflicting aspects of design. Although the total cost of a finished house will vary between each of these communities due to the cost of regional materials and other site specific conditions, affordability should be considered in designing disaster relief since most victims come from low-income families and cannot afford. Low-maintenance materials are

3. Ease of construction:
The labor force that builds most of these houses are not trained construction workers or much less professionals. These are individuals from the community affected that may not be experiences with power tools nor the appropri-
ate method for building a wall. Many of the houses will be constructed in part by volunteers working with different organizations. The more work that can be done by volunteers the greater number of homes that can be provided. This must be a crucial element of the design because it will significantly aid the rate of construction of the units and the more families and victims that can be accommodated.

4. Sustainability and Materiality
It is important to minimize the negative environmental impact of buildings by efficiency and moderation in the use of materials, energy, and development space. Sustainable architecture uses a conscious approach to energy and ecological conservation in the design of the built environment. This is where I believe architecture should focus its energy. As time advances we are depleting our resources and as architects we need to focus on the efficiency of the buildings we design rather than their exterior visual appeal. Use local and regional materials that are available without long lead times or expensive transportation to the site. Renewability has become a recent focus in specify-

5. Passive strategies:
Combining passive environmental strategies and strategies and architectural elements. Strategies like large floor to ceiling windows allow maximum light. Sustainable architecture is architecture that seeks to optimize the energy performance of the building and minimize its ecological footprint.

6. Energy and resource efficiency:
The future of energy costs is uncertain and each of the communities associated with this competition face constraints on natural resources and materials. Any winning submission must not only be affordable to build, but afford-
able to operate and occupy for its full life-cycle.

7. Modularity
Based on the principle of using a single shape and size, a module, with which to construct a building. The functions of the building are housed in the number of modules required per function. Modules must be functionally space efficient and flexible enough to form a variety of configurations. I am interested in the vast set of tools that modular architecture proposes. It is a system composed of separate components that can be connected together, a system where you can replace or add any one component without affecting the rest of the system. This to me forms more of a challenge to design – finding several solutions for one problem or arriving to different solutions by abiding the same set of parameters in different ways. This could be a solution for the housing relief efforts because it could easily adapt its form to accommodate for different uses. Modularity also deals with the issue of space scarcity and attempts to optimize use of the available space by assigning different functions to the same space.

8. Aesthetics and Quality:
No design can truly be successful unless consideration is given to the lives of its occupants. The design must be simple and yet enhance the quality of life for the families who will take ownership. These units should provide their inhabit-
ants with a sense of home and recovery.

ING materials for construction. Temporary structures if not recycled, contribute significantly to the growing amount of construction waste. Planning for their afterlife should occur during the design process, and temporary structures should be recycled or reassembled completely so they do not send up in a landfill after a single use. This loop of re-
source recycling and reuse is known as “cradle to cradle” design.
I would like to acknowledge the help and guidance from my Chair and Co-chair, Prof. Bradley Walters and Prof. Stephen Belton have guided me and encouraged me not only through the process of this research but throughout my entire graduate and undergraduate education. A special thanks also to Prof. Charlie Hailey for introducing me to the world of camps and transitional spaces.

Most of all I would like to thank my parents, Julio and Alejandra Moreno. Thank you for having the courage to immigrate to this country for the purpose of my having a better future and a chance to be anything I ever wanted. This MRP is proof of the success of that sacrifice you both made fifteen years ago for me and my brother, I would have not had this chance otherwise. Thank you.
Cristina E. Moreno earned her bachelor’s degree in design from the School of Architecture at the University of Florida in spring 2012. She then pursued a concurrent degree program in which she earned a Master of Science in Construction Management in fall 2014 and a Master of Architecture in spring 2015 from the University of Florida. During her studies as a graduate student, Cristina participated in several projects with the college’s faculty. She was part of an IDP team composed of students from both the construction management program and architecture program that redesigned and built a sustainable mobile kiosk for the UF Sustainability Department. Cristina was also part of a student effort partnered with the College of Public Health and Health Professions that helped design and create construction drawings for a research UF initiative in Haiti.

She aims to develop a career where she can improve the architect-contractor relations and eventually obtain her Architect’s license as well as her General Contractor’s license.
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