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I, Breanna Praechter, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture (Master of).

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Transitions: Bridging the Gap between Emergency Shelters and Permanent Solutions in Disaster Reconstruction

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TRANSITIONS:
Bridging the gap between emergency shelters and permanent solutions in disaster reconstruction

A thesis submitted to the Graduate School of the University of Cincinnati for partial fulfillment of the requirements for the degree of

Master of Architecture

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With the recent devastation caused by natural disasters, aid organizations have been faced with the challenge of providing shelter for victims; unfortunately, there is a lack of transition between short-term emergency structures and permanent homes. This thesis explores the aid provided by designers as second responders and how architecture can play a role in the long-term rebuilding process. Two crucial elements will be studied: flexibility and cultural identity. Both of these factors are critical in the sustainability of any reconstruction project, especially when foreigners are providing much of the assistance.

Organizations, like Architecture for Humanity, have created a network of professionals, tackling the issues that surround disaster reconstruction. Elemental, a firm in Chile, has designed incremental homes, learning from the natural growth of informal settlements. By exploring these, and other small-scale projects, a proposal will be made for a system and participatory process that can be implemented in the Simon Pele community of Port-au-Prince, Haiti, an area damaged by the January 2010 earthquake. Often aid organizations implement universal solutions, making broad assumptions on the needs of victims. Through community participation and professional involvement, disaster relief can provide homes that foster
resiliency in residents, and become a catalyst for positive change, allowing individuals to help themselves rather than simply taking a hand out. This is not a single solution, but a framework that encourages adaptation in order to attain the most enduring results.

The physical layout of Haitian communities is a direct link to the social structure of the culture. Traditionally, families lived in clusters with a shared courtyard, or lakou. This historic settlement pattern has been adapted to the urban environment, evident in informal settlements and internally displaced peoples camps. By analyzing this cultural phenomenon, a proposal can be made that is sensitive to the relational needs of the existing community and reinforces the resilient social structure the lakou creates.

Because of the lack of natural resources in Haiti, selection of building materials must be carefully considered in any construction project. By reusing existing materials in the form of rubble and emergency shelters that currently exist on the site, a more logical transition can be made with minimal cost.
0.01 Image of transitional shelters constructed after the 2010 earthquake in Port-au-Prince, Haiti.
0.02 Author with Haitian child in rural village outside of Port-au-Prince.
Thank you to my incredible Serve Beyond Cincinnat team. That week in Haiti will remain with me forever and inspired this research.

To my professors (especially you, Aarati) and studio peers for your support and countless hours pushing me forward.

To my family for your endless love and encouragement. And for always having a hot meal waiting when I needed to come home.

To my husband for believing in me and getting me through this year, even when we were in different states. I could not have done it without you by my side. You are my favorite.

To all of the beautiful Haitian children, especially Carvensly. This is for you.
Emergency shelters near the Port-au-Prince airport.
I was riding along a dirt road outside of Port-au-Prince, almost two full years after the 2010 earthquake that devastated the Haitian capital.

Rubble still remained, as if the earthquake had shaken the ground only yesterday. As my bus neared the outskirts of the city streets, the landscape opened up, revealing the beautiful mountains beyond. Tent cities became visible on either side of the path, and I asked the translator why the tents were still here. I knew that emergency shelters had been erected immediately following the earthquake but assumed that these thin coverings had since been replaced. I was informed that they were homes. Every tent was still occupied, and families had been living in them since the earthquake.

Were these tents necessary immediately following the earthquake? Yes. Were they intended to become permanent homes? No. Unfortunately, many of these organizations were no longer in the country, leaving the victims to cope alone, virtually homeless. Many of the disaster aid groups assumed that victims would want to leave their damaged city behind; when in reality they did not want to move away. They wanted to rebuild on the site where they had grown up, raised their children, and had countless memories. Through a participatory process, long-term solutions can be implemented, allowing families to continue living in their current communities, and increase their resilience for future disasters.
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Construction site for a three room home financed by an American non-governmental organization.
Assumptions are made on what is most important, and solutions are administered with little or no input from the actual victims. This results in humanitarian projects that simply hand out assistance rather than implementing solutions that foster resiliency among beneficiaries. In *Rebuilding After Disasters*, “post-disaster reconstruction is defined as the process of improvement of pre-disaster conditions, targeted to achieving long-term local development and disaster risk reduction.” Without long term plans in place, many aid organizations are doing little to improve pre-disaster conditions. Low-income countries account for only nine percent of the world’s disasters but forty-eight percent of the resulting fatalities. This is largely due to the financing involved: sixty-nine percent is spent on emergency response, with only twenty-four percent focused on reconstruction. By targeting the process of rebuilding rather than the end product, a more valuable solution can be realized that prevents future devastation and improves the quality of life for disaster victims.


3 Ibid.
This document begins with a general overview of disaster response and how architecture has been involved in the aftermath. By exploring the typical timeline of rebuildings, a solution can be implemented that provides long-term results in a practical timeframe. The discussion focuses on projects that are making a positive change rather than dwelling on the failures.

The process and key players are discussed next. This portion argues that involving the victims as active decision makers greatly improves the longevity of the project and encourages further development. Safety is the primary concern following a natural disaster, but aid should not stop there. Solutions must incorporate a phased plan that provides long-term sustainability.

This chapter also examines how individuals are building for themselves in informal settlements. These communities feature innovative solutions, allowing homes to evolve and adapt over time. By exploring what is working in these self-help projects, similar ways of thinking can be incorporated in future development.

Two critical criteria for rebuilding are discussed in the next section: flexibility and cultural identity. These elements are explored through precedents and relevant literature. These two themes were prevalent in precedent research, reinforcing their importance. Flexibility and identity are at the core of the design decisions incorporated in this project.

The document goes on to describe the specifics of the culture of Haiti and the relevant dwelling typology. Many cultural requirements are a direct result of the country’s violent history, and these issues continue to impact everyday life. Studying the typical home of the region is also important in understanding user’s needs that go beyond a simple shelter. Many features
of the typical Haitian home are necessary because of the climatic and spiritual requirements. By studying the history of the living unit, a connection can be made to the new, urban typology.

A brief introduction of the specific site in Simon Pele follows. This informal settlement is dense, but additional open space has been acquired since the earthquake. One of these recent tent camps is the location of this design proposal.

The next scale proposes a building workshop that has two roles: a place where residents can learn safe construction techniques and a central location for resource collection. This section also elaborates on the proposed recycled materials, showcasing the need for heavy and light construction methods.

The last intervention zooms in to the core family unit. This one room structure provides basic security and shelter, with opportunities to add on and upgrade. The proposed layout is directly related to the lakou tradition already present within the tent camp.

This research is not a single solution but a framework for design that must be adapted to specific conditions. Architects have the tools necessary to begin the discussion, but beneficiaries must be active participants in the process. This work is meant to inspire and ask designers to reimagine their role where it is needed most.
Rubble from a home destroyed during the 2010 earthquake.
02.02 Diagram comparing the ideal reconstruction timeline and actual timeline in many disaster situations.
The devastation of both loss of life and of buildings has been astounding in recent years, and professionals are beginning to recognize their role in the creation of better solutions. Aid is administered in the weeks following the disaster by first responders, but little is done to implement a long-term solution.

Although humanitarian architecture is not a movement across the profession, small groups of designers are proposing projects that are making an impact. Cameron Sinclair, the founder of Architecture for Humanity, is one of the most influential individuals in the field of humanitarian design. In his publication, *Design Like You Give a Damn*, Sinclair features recent innovations that are changing the world in some of the poorest regions. Although not solely focused on disaster reconstruction, Architecture for Humanity is an organization creating a global network of professionals “com[ing] together to envision a better future.”4 This, and many other organizations, are forcing professionals to rethink their role in disaster reconstruction and challenge them to expand the responsibility of health, safety, and welfare to include those most in need.

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Emergency tent camps set up in the mountains outside of the Haitian capital, relocating victims.
Design professionals have the tools to incorporate safe solutions but must rely on residents’ input in order to achieve projects that provide value to the users long-term. Emergency aid is needed, but a process of rebuilding must be incorporated next, working towards the eventual goal of individual, sustainable dwellings: places that not only return residents to their pre-disaster state but improve their quality of life beyond what was experienced previously.

Traditional rebuilding processes primarily involve foreign non-governmental organizations and local governments. Unfortunately, these agencies often do not include victims in the rebuilding process. Handouts do little to enable individuals, but true empowerment can be found when individuals have an active role in the decision making. Whether it is providing feedback or contributing physical construction labor, beneficiaries offer potential that is primarily untapped in recovery efforts. The value of ownership in aid projects is stressed in Out of Poverty by Paul Polak, the founder of International Development Enterprises, an organization improving methods of small, impoverished farmers internationally. Trained as a psychiatrist, Polak establishes three steps in learning about people: interview them where they live, learn through their eyes, and ask details about the places where they live their lives.5

5 Paul Polak, Out of Poverty: What Works When Traditional Ap-
Polak also states a common myth surrounding aid: “we can donate people out of poverty.” Although funding is necessary, simply subsidizing projects will do little to establish enduring solutions. Instead, progress is most sustainable when “poor people have to invest their own time and money.” By “thinking of poor people as customers instead of recipients of charity,” and allowing their needs to drive the design, projects can be completed with greater value to the users.

Victims are not helpless, and oftentimes, they contain more momentum and initiative than any aid volunteers. This energy must be utilized in order to develop lasting solutions, establishing a sense of place for users and empowering them to enhance their individual capacity to thrive. This momentum can sometimes be captured by redefining the roles of victims, designers, and organizations involved in disaster reconstruction. These roles are explored by the authors of *Architecture, Participation and Society*. Key attributes of community architecture are highlighted with the following discoveries: “users are - or are treated as - the clients,” experts act as the “enabler, facilitator and social entrepreneur,” scale is “determined by the nature of the project, the local building industry and the participants,” design style has “concern for identity,” and the final product is “flexible, slowly improving, and easy to manage.” Each of these points should be carefully studied in disaster reconstruction, allowing the victims to become active drivers in the process.

The process of reconstruction is reiterated in *Rebuilding After Disasters*, a book that discusses precisely what its title implies,

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6 Ibid., 34.
7 Ibid., 39.
8 Ibid.
03.02 Mapping displaying key themes in research process.
03.03 Map showing the dense urban fabric within the Haitian informal settlements.
particularly in the area of permanent homes. As the editors point out, most assistance is issued in the form of emergency shelters and temporary structures. Unfortunately, these projects typically involved “standardization and resulted in repetition of a ‘universal’ unit that rarely responded to the specifics of climate, topography, local customs, and local forms of living.”

A better solution can be realized by observing informal housing, where “about half of the housing stock in developing countries” exists. These slums, although working outside of legal and building code frameworks, adapt to address immediate needs of their inhabitants. The variety this creates allows for the evolution of homes, which “becomes a powerful way of personalizing each of the units.” Social, economic, and environmental responsibilities must be implemented in order to meet location specific needs.

Through the case studies provided in this research, it is apparent that flexibility and cultural identity are crucial, not only in the final design success, but in the project’s ability to become a catalyst for further rebuilding. While community centers are needed in the initial aftermath, dwellings are necessary for individual empowerment. Not only do dwellings provide safety; they often contribute a place for employment.

2610 South Architects explored building uses in Diepsloot, an informal settlement in Johannesburg. Despite the cramped living conditions, many homeowners were utilizing a portion of their house for rental income or business activities, especially in structures adjacent to main vehicular routes. Whether the building is a space for making goods or literally transformed into a

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10 Lizarralde, Johnson and Davidson, Rebuilding, 10.
11 Ibid., 29.
12 Ibid., 40.
13 Ibid., 20.
storefront, individual homes offer a platform for resiliency and future income. This study along with resident input, resulted in the need for commerce space as well as typical living units within the home.

Community participation should not be included in only one step; it should be incorporated in the entire process, giving the users freedom to make decisions about the final design rather than simply approving already conceived ideas.
03.04 Study conducted finding buildings used for commerce in informal settlement in Johannesburg, South Africa. Structures highlighted are used as businesses within the residential community.
04.01 Quinta Monroy incremental housing project in Chile.
The first of two key elements involves adaptation and expansion over time, in order to anticipate changing needs. Polak introduces the concept of the “one-hundred-dollar house,” a skeleton structure providing immediate shelter, in which infill can be added over time as families acquire more money. This approach provides a home with real economic value as well as the sense of ownership. Although Polak’s overall ideas are not centered on architecture, he realized the role shelter plays in the livelihoods of individuals. In disaster reconstruction, the number of homes needed can be overwhelming. By implementing a less expensive construction of the bones of a home, funds can impact more families for less. In Polak’s research, “when poor people earn more income, they often invest in home improvements.”

If efforts to create permanence are initiated, it is likely that those structures will be a catalyst for future development, allowing the residents to help themselves and their community as a whole.

In Quinta Monroy, Chile, the designers of Elemental proposed a phased solution for a community of illegal settlements. Land was scarce, so by building vertically, more families were helped.

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14 Polak, Out, 73-74.
15 Ibid., 179.
Each structure was initially built with the basics of a kitchen and bathroom, leaving the remainder of the plan open for future division. In the areas with only one level, additions could be made to infill if needed. This process has since been implemented in several Latin American communities with successful results. After only a few years, individual units have been decorated and expanded, and the communities are thriving.

Modularity was also used in the reconstruction following the 2004 tsunami in Southeast Asia. The devastation created the need for an immense number of stable homes at low costs. A collaboration between the Harvard Graduate School of Design and SENSEable City Laboratory at MIT, resulted in the Safe(R) House, a proposal that reinvented existing concrete block building techniques in Sri Lanka. By carefully studying computer models of designs, a final plan was implemented with “four C-shaped concrete structures that provide higher resistance without blocking the flow of water.” Infill was initially constructed with bamboo, a material that was locally abundant and allowed for ventilation. Most importantly, the basic design could be constructed for $1,500, “comparable to the price of a typical Sri Lankan home.”

By implementing a modular system, the home could be expanded as needed, allowing for varying configurations. The bamboo partitions could be upgraded over time, “engaging residents and promoting the reuse of elements from collapsed buildings.” This modified building technique allowed for the use of local skilled laborers, reducing the overall cost of the project and merging with traditional building methods. The modular units could be constructed quickly,

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17 Architecture for Humanity, Design Like You Give a Damn: Architectural Responses to Humanitarian Crises (New York: Metropolis Books, 2006), 126. See Figure 1.
18 Ibid.
19 Ibid.
20 Ibid., 129.
04.02 Exploded axon of Safe(R) House exploring disaster reconstruction in Sri Lanka.
providing adequate stability for a number of families, and allowing the residents to make decisions on expansion and materiality over time. Unfortunately, there was no evidence of the design team communicating with the victims during the process. Although, the adaptability seemed to take into account the varying needs of families, there was no opportunity for decision making from the homeowners. Involving the users in the design process may have resulted in a more appropriate solution that was not apparent initially. These two examples exhibit how future needs can be incorporated in initial plans, resulting in efficiency and empowerment for long-term results.
04.03 Diagram showing flexibility of Quinta Monroy housing project.
05.01 Image of Butaro Hospital Project by MASS Design Group in Rwanda.
When designing in foreign environments, cultural identity is critical. This element is location specific, requiring immersive research before project implementation. By incorporating cultural requirements, reconstruction can become inclusive and symbolic for an entire community. As Amos Rapaport states: “Because building a house is a cultural phenomenon, its form and organization are greatly influenced by the cultural milieu to which it belongs.”

MASS Design Group incorporates local labor, local materials, and collective knowledge in all of their projects in order to build capacity. Their Butaro Hospital project in Rwanda creates dignity within the community and becomes a catalyst for further improvements. Using locally harvested volcanic rock and a new labor intensive construction method, the benefits went beyond the walls of the hospital, creating jobs for locals. Not only was the project sensitive to the cultural conditions, but the design improved on traditional methods in order to create an improved construction. This decision “reduced the facility’s price tag to roughly two thirds of what a comparable hospital would typically cost in Rwanda, saving 2 million dollars.”


05.02 Diagram illustrating the relationship of key elements of the Butaro Hospital Project in building local capacity.
in construction fees but also providing over 4,000 jobs.\textsuperscript{23}

TYIN Tegnestue Architects also incorporate cultural conditions in their projects. The Cassia Co-op Training Centre focused on local materials and labor to bring awareness to the poor working conditions in cinnamon production.\textsuperscript{24} This research also resulted in a climatically responsive design, including thermal mass and natural ventilation. In a location where earthquakes are prevalent, the design team relied on current technology and local knowledge to construct the most appropriate structure.

It is important to point out that neither of these projects were built with foreign assumptions on what would be most appropriate. The local communities were involved in each step of the process, ensuring that the building truly met the needs and wants of its users. While these projects are noteworthy, they were constructed to serve entire communities, a scale that is larger and fundamentally different than individual dwellings. Each community is a part of a unique cultural framework that directly affects how individuals inhabit space, especially in homes. When projects incorporate cultural conditions, the results are more appropriate and enduring.


05.03 Image of Cassia Coop Training Centre in Indonesia
5.04 Diagram explaining the use of local materials and climatic considerations utilized by TYIN Tegnestue Architects
CONTEXT
06.01 Image of market street in Port-au-Prince.
06.02 Destruction of the National Palace in Port-au-Prince following the earthquake.
On January 12, 2010, a magnitude 7.0 earthquake rocked Haiti. Although the epicenter was located outside of Port-au-Prince, the capital city experienced much of the damage because of poor building conditions and dense urban neighborhoods. The devastation resulted in 105,000 homes destroyed, 2.3 million people homeless, and 19 million cubic meters of rubble. After assessment, it was estimated that damages amounted to $7.8 billion, one hundred and twenty percent of Haiti’s gross domestic product. Considering Haiti was the poorest country in the Western Hemisphere before the disaster, the damage was devastating. Unfortunately, much of the death toll could be blamed on poor construction methods and lack of building code enforcement. Cameron Sinclair wrote an article days after the Haiti earthquake, describing the key issues the disaster presented:

It is our job to build homes that are not only safe but incorporate the needs, desires and dreams of the families that will live in them. Additionally, like after Katrina, we are not just building a roof over someone’s head -- we are building equity. To many, their home is their safety net. They don’t have 401Ks or investment

26 Ibid.
accounts. If we build homes the same way they have been built before, we are just setting people up for this again. We can force better building codes by building examples of what the future will look like.  

So far, much of the disaster aid has been in the form of emergency and transitional shelters. These primarily consist of tarps or plywood coverings, meant to be utilized for up to one year. The primary complaints about these existing dwellings are the heat and lack of security. Disregarding these projects and materials will only create more waste, missing an opportunity to aid in a more logical transition. With rapid deforestation and few remaining natural resources, materials play a critical role in reducing or adding to the costs of construction.

Haiti presents a fragile environment that has been teeming with non-governmental organizations for decades, which only expanded with the devastation following the 2010 earthquake that shook the country. Aligning with an organization that is committed to Haiti’s long-term sustainability is critical for establishing trust within the country and resulting in enduring solutions. Habitat for Humanity has been working in Haiti for almost thirty years, and their efforts have expanded since the recent earthquake. Founded by Millard Fuller in 1976, Habitat was an early adopter of self-help building initiatives, combining volunteer efforts with the labor of those being helped, expediting the construction process while creating a sense of ownership. Habitat’s commitment to an “urban development approach, which

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is based on empowering and strengthening communities in defined geographic areas," aligns with this proposal of a holistic process of disaster reconstruction.30

Habitat for Humanity declared the “goal of serving 50,000 families” in Haiti between 2010 and 2015.31 These undertakings include construction education, current home assessments, and plans to “mitigate future disasters, utilizing disaster-resistant home designs.”32 The development plans are community based, helping individuals “to build self-confidence to take action, identify and prioritize their needs, […] develop community action plans and leverage their collective capacity to advocate for change.”33 These intentions align with the organization overall disaster response mission “to develop innovative shelter assistance that generates sustainable interventions for people affected by disasters or conflicts [and] to provide education, training and partnerships in disaster mitigation, preparedness and recovery.”34 By creating permanent homes, Habitat for Humanity is working to build back better through physical buildings and community spirit.

In addition to the organization’s individual efforts, Habitat for Humanity is currently partnering with Architecture for Humanity in the development of reconstruction plans for Haitian communities damaged by the earthquake. AFH brings the skills of professionals to impoverished areas in an effort to utilize “thoughtful, inclusive design creat[ing] lasting change in communities.”35 AFH opened the Haiti Rebuilding Center in 2010, with a staff including many professionals...
Haitian born professionals, as well as staff who worked on rebuilding efforts in New Orleans after Hurricane Katrina. The Haiti Rebuilding Center is currently working on several community reconstruction efforts, but the organization has not started construction on any form of permanent individual homes. Habitat for Humanity has completed permanent homes, but the plans lack individuality in an effort to reduce cost and construction time. By collaborating with both of these partners, a community driven process can be implemented that provides longevity and a sense of place for the residents.
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06.03 Habitat for Humanity homes constructed in Leogane, Haiti, lacking individuality.
Haitian child washing clothes in the shaded outdoor space between informal homes.
Looking specifically at the residential building type of Haiti, it is difficult to establish a current vernacular style. While most recently built homes were constructed of concrete block, many of these structures fell during the earthquake, making residents view concrete as unsafe and undesirable, even though reinforced concrete is earthquake resistant when constructed properly. Many of Haiti’s early citizens were slaves, brought to the Caribbean from African nations. These people brought their cultural traditions as well as the shotgun style housing type, a linear plan, one room wide and several rooms long.

Historically, shotgun homes were based on community interactions and adaptable to various tasks. This typology can be traced back to “Yoruba dwellings of Nigeria, via ... the maison basse of Haiti.” Often featuring deep front porches, the style sets up an in between space, stitching together the public and private lives of the community. “When organized in multiples, they can provide small individual front yards and a communal rear yard,” known as lakous, expanding livable space beyond the walls of the structure. This community aspect is crucial to the daily lives of Haitian families.

36 David Brown and William Williams, Row: trajectories through the shotgun house, Houston: Rice University School of Architecture, 2004, 34.
37 Ibid., 17.
One primary intention of the shotgun dwelling typology was the ability to extend the home by adding additional bays over time. By offering long lot sizes, a small building can be constructed to provide basic aid and offer room for expansion by the individual homeowners. This helps the maximum number of people while also instilling a sense of empowerment as families rebuild for themselves in the future. Other than the flexible features of this typology, the style also has many efficient modern advantages. By utilizing a small footprint, the structures take up less land and use less exterior materials. If oriented properly, the homes can also take advantage of cross ventilation and shading from harsh sunlight.

In many of the urban neighborhoods of Port-au-Prince, buildings are laid out organically, with little apparent order. Despite this initial impression, the in-between spaces create a vibrant community that begins to thread together public and private zones. Structures adjacent to main vehicular routes are often used for commerce, and the more intimate central courtyards become places of community gathering and interaction. The rural lakou has been transformed into a new urban typology, but it is still very much alive in Port-au-Prince. More than the physical layout, the lakou represents a social structure. Families that share a courtyard also share responsibilities and become a “family.”

Most homes in the urban context are one story, with cast in place roofs. Unfortunately, much of the remaining infrastructure is unsafe, despite the fact that residents are still occupying these homes. Homes create an intimate program, with each family possessing varying requirements. The most basic activities require space for cooking and sanitation, in addition to sleeping. These can be provided through a simple core structure implemented in the
07.02 The evolution of the lakou from traditional rural conditions to the modern urban environment.
Diagram showing the differences in the social structure of traditional and modern urban environments. This structure is directly related to the importance of physical lakous.
beginning of construction, assuring that victims will have their most basic needs met quickly. In typical Haitian homes, the enclosed structure consists of sleeping and storage spaces, with other activities occurring outdoors. Because of the hot climate, shade is ideal for these spaces, utilizing natural ventilation for both human comfort and the removal of cooking smoke. The home could be opened up to the outdoors and offer a place of interaction for community members. This leaves sleeping and storage spaces in the center of the structure, areas that require little daylight.
Diagram of a typical Haitian family’s daily activities. Many of these occur outside, in shaded areas.
07.05 Diagram of the physical requirements of an urban Haitian home.
The location of the Simon Pele community in relation to other important monuments within Port-au-Prince.
The community of Simon Pele is an informal settlement that began because of its proximity to industrial jobs and other services such as hospitals and schools. The site is accessed by Rue Toussaint Simon. This main road is the commercial core of the community, and buildings adjacent to the street are used as market and business spaces. Seven individual neighborhoods make up the community as a whole, along with over five large internally displaced peoples camp sites. The specific site of this project is located on one of these camp sites, adjacent to the main street.

Since the 2010 earthquake, Habitat for Humanity has been working in Simon Pele, implementing infrastructure including drinking water, latrines, and street lights. Programs are also being incorporated to upgrade unsafe structures, but no plans have been made to build permanent homes.

Although informal, the existing context incorporates many of the traditional elements of the rural communities found throughout Haiti. Homes are typically centered around a central lakou, or courtyard. As previously stated, this shared outdoor space is critical to the daily lives of Haitian families; cooking, gathering, and many other daily activities occur outdoors. Enclosed structures are only utilized for sleeping and storage. Although
at an increased density, the lakou is still alive in the urban neighborhood. This cultural aspect is ideal for a core home model where the earthquake resistant structure is smaller and primarily used at night. Therefore, the other elements of the living space can be made of light construction and flexible, without the need for earthquake resistance.

Another important consideration is construction materials. Because of poor soil conditions and deforestation, Haiti has no real natural building resources. The one material that is in abundance is rubble. The destroyed concrete structures can be crushed and reused. This material is ideal for the solid, heavy construction necessary for the core. Focusing on the lakou as well as materials allow the project to incorporate flexibility and cultural considerations.

Although one specific site will be studied in depth, other sites throughout the capital city can be proposed for further reconstruction, implementing similar strategies that can be applied regionally. Several factors will need to be considered for reconstruction, including land ownership, location to services, and job availability in the area. Beginning with the same basic core model, each community can be adapted further to ensure appropriate design, meeting the needs of individual families in varying situations. While many reconstruction plans propose moving people outside of the crowded city, this concept allows victims to continue their way of life, in a more sustainable manner. Residents will be located near markets, jobs, hospitals, and other services that may not be available outside of the city. By continuing the habitation of Port-au-Prince, a thriving urban life can be realized.
08.02 Map of Simon Pele showing the major vehicular routes and areas of commerce.
DESIGN
09.01 Diagram showing the design process through each phase and approximate timeline.
09.02 Map showing the location of the tent camp within the Simon Pele community.
A specific site was chosen where an internally displaced persons camp currently exists. Because the site was open land prior to the earthquake, it is an ideal location for constructing new homes. Compared to other tent camp locations, this neighborhood is adjacent to the main vehicular route where markets take place. This will provide potential income for residents as well as access to hospitals, schools, and churches in the surrounding community.

As previously discussed, Habitat for Humanity has already implemented infrastructure within Simon Pele, but the tent camps are still without clean water and latrines. Setting up these services is the first priority and will trigger further development. Bamboo planting will also be introduced throughout the site, providing materials for future construction and acting as a natural boundary to divide space.

These shared spaces will be public and incorporate shading so that the area can be utilized for markets and other community needs. The existing lakous in the urban environment create overlapping hierarchy, with some courtyards public and others more private and secluded. With wide entrances and open spaces, these service lakous will be the most public, with pedestrian routes and shared infrastructure.
09.02 Map of specific site of existing tent camp where design is proposed. Specific interventions will be implemented initially, sparking further reconstruction.
09.03 Map of proposed services locations, with a twenty-five foot radius, showing the accessibility throughout the camp.
10.01 Exploded axon of the training workshop.
In order to teach proper earthquake resistant construction techniques, a training workshop will be constructed, serving as an example of full scale homes. This will serve as a learning tool, and can be deconstructed to become homes once the training is complete.

This building will exhibit both the enclosed, secure space as well as the outdoor lakou of the design. Because most activities occur outside, this space becomes critical to the layout and orientation of the physical structures. The design juxtaposes heavy and light construction, for both efficiency and safety. The heavy core structure will provide safety in the event of another earthquake. The lighter components will provide protection from the harsh sun, but can be disassembled in the event of a disaster. Therefore, resources are not wasted in constructing a larger earthquake resistant building. Instead, these outdoor spaces can exhibit lighter, and cheaper, construction methods.

Most importantly, the training workshop will be a space for recycling materials used for home construction. There are three primary resources utilized: rubble, tarps, and bamboo. The rubble and tarps currently exist on the site and surrounding neighborhood. They do require collection and the disassembly of emergency shelters. Rather than creating more waste, these
materials can be reused to create more permanent structure.

The rubble will be used in an earthquake safe method, utilizing gabion wall construction. The walls will consist of welded wire mesh filled with rubble of various size. The density will be greater at the base, providing stability and security. Moving up the wall, the concrete pieces become larger, naturally creating gaps for ventilation. Not only is this construction technique low cost, but it can be constructed with little skilled labor, meaning homeowners can have a hand in building their own home. This will create ownership and speed up the timeline.

Skilled labor is typically utilized in the construction of housing foundations. Using individually carved rocks and mortar, a elegant and stable base is built. This method can also be incorporated in gabion wall construction, by chipping away at rubble to create a more uniform exterior. Although this method is not necessary for the stability of the wall, it results in an aesthetic that is in line with traditional building techniques.

By disassembling existing tents, the tarps can be reused for shading in the lakous. The plastic will be cut as required, and strung between structures. Again, this is virtually no additional cost, and can be assembled with little skilled labor.

Lastly, harvested bamboo will be used in both the heavy and light construction. Bamboo rods will provide reinforcement in the gabion walls, as well as act as trusses for the roof construction. It can also be utilized as screens and doors for openings in the core home construction. The bamboo will also serve as sticks for the light construction within the courtyards, holding up the tarp shades.
10.02 A trained worker constructing a stone and mortar footing.
10.03 Workers building stone and mortar footing.
10.04 Diagram showing the process and use of the three primary design materials.
Diagram showing the activities and characteristics of the core space and in-between lakou.
The secure core of the home is modest in size, conserving resources and labor. The primary activities that occur in the enclosed space are sleeping and storage. Therefore, the dimensions are based on comfortable sleeping arrangements. Because families have varying needs and sizes, the module can be expanded as necessary.

The basic structure consists of “U” shaped walls, for strength and stability, that can be pushed, pulled, and rearranged as desired. This layout also creates lined up openings, allowing for cross ventilation. It also separates the two programmed spaces, designating one side as storage and one as sleeping area.

The heavy core is constructed of the gabion walls previously discussed. These provide security while also reusing existing materials. The walls are reinforced with steel or bamboo if available. Each gabion basket is a similar module, making construction faster and simplified. Although the baskets will be connected, they will not be permanently attached to the ground. This allows the units to be disassembled and moved if necessary, adding to the value for the beneficiaries.

Four to six cores are constructed in clusters, creating a shared lakou between. Although the courtyard is shared among
the residents, it is private otherwise. This level of privacy is reinforced by the relationship between core units. Openings are constricted, discouraging entry. This constriction contrasts the expansion created between units by placing them at angles, against the typical orthogonal layout of NGO provided transitional communities.

The heavy construction of the core units is contrasted with the light shading within the lakou. Because of the harsh climate, shading is necessary for outdoor spaces. By disassembling plastic emergency shelters, this material can be repurposed for shading. Bamboo sticks provide the poles and plastic tarp can be stretched between. The lightness of these structures allows them to be easily disassembled and do not provide a safety threat if an earthquake occurred again.

The physical layout of the lakou is necessary for the social structure of the Haitian community. This design is not proposing the specific location of core units, but it provides the materials and flexibility for residents to make these decisions. Victims within the tent community have already created shared lakous. By providing materials and earthquake safe building methods, this community can continue to rebuild for themselves.
11.02 Examples of tent layouts in Simon Pele that create shared lakous.
11.03 Floor plan of basic core, based on required sleeping dimensions.
11.04 Section of core home with roof options.
12.01 Rendering of two core homes with a lakou between.
CONCLUSION

Design professionals have a responsibility to protect the well-being of people, regardless of their financial situation, but as John F.C. Turner highlights:

The certified professional makes a fool of himself, and often does a great deal of harm to other people, by assuming that he knows more than the uneducated by virtue of his schooling. All that second- and third-hand knowledge and intellectual exercising does for him, however, is to reduce his ability to listen and learn about situations significantly different from his own social and economic experience – with consequences that can be tragic when he has the power to impose his solutions on those who are not strong enough to resist.38

Utilizing the skills unique to architecture, innovative solutions can be implemented in areas where dwellings are greatly needed. It is important to steer clear of handouts, instead focusing on community driven design, allowing the residents to be an integral partner in the decision making process. Disaster reconstruction is not a problem that is going to disappear, but architecture has the ability to greatly minimize the devastation of future risks. With proper construction techniques, many


*It is with this surety that we must stand with Haiti, a country whose spirit and people will never be broken, and work in solidarity toward the future the Haitian people deserve.*

- Paul Farmer, Haiti After the Earthquake
of the casualties of the 2010 earthquake in Haiti could have been avoided. Through education and demonstration, residents can learn how to construct their own homes and maintain them, preventing vulnerability in the future and improving livelihoods.

Of the homes that were still intact after the earthquake in Port-au-Prince, rebar extended past the top floor, reaching to the sky. I learned that this decision had been made so that additions could be easily constructed and united with the existing structure. Despite the immense poverty the country faced, Haitians were still hopeful, believing that a better future was in reach. This resiliency has been instilled in Haitians since the country’s independence in 1804.\textsuperscript{39} They are not helpless; they are hopeful. This determination could prove valuable in Haiti’s rebuilding efforts.

Natural events only become disasters through the fragility of man-made settlements; “earthquakes don’t kill people, houses do.”\textsuperscript{40} With the rapid increase in urban populations and poverty, these disasters are unlikely to diminish unless action is taken to prevent future risks. Waiting until the next catastrophe strikes will be too late to prevent the unthinkable damage. While disaster reconstruction is mandatory, work can be completed now before more destruction takes place.

\textsuperscript{39} Paul Farmer, Haiti: after the earthquake (New York: Public Affairs, 2011), xi.

\textsuperscript{40} Lizarralde, Johnson, and Davidson. Rebuilding, viii.
12.02 Men resting along a main road in Port-au-Prince.
Haitian woman selling clothes to passing cars.
BIBLIOGRAPHY


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