Architects as Activists: Designing Hope and a Future for a Haitian Community

An Honors Thesis (HONR 499)

by

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Abstract

Building upon my experience as an intern with Engineering Ministries International during the summer of 2013, I designed the next phase of a community development project in Croix des Bouquets, Haiti—a primary and secondary school for local Haitian children—for a client ministry called Life Is Hope. The project explores design solutions that are environmentally, economically, and contextually responsible. The thesis project is a comprehensive design project, exploring construction techniques, materials, sustainable design strategies, cultural context, and the effects of design elements on the learning process. All culminate in a final design that works to respond to both the needs and the strengths of the people and the climate.
Acknowledgements

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I would also like to thank the staff at Engineering Ministries International for the incredible experience that led to this project as well as all the guidance, wisdom, and teaching they shared.
Author’s Statement

In the summer of 2013, I interned for a non-profit organization called Engineering Ministries International (EMI) at their Canada office in Calgary, Alberta, Canada. Engineering Ministries International is an international organization made up of architects, engineers, and other design professionals that provide design services for developing countries all over the world. As a part of this internship, I travelled to Haiti with a multi-discipline team to develop a community plan for a client ministry called Life Is Hope (a sub-organization of a church network called the Shiloh Evangelical Association). We designed phase one of this plan for the Croix des Bouquets neighborhood just outside of Port-au-Prince: a new facility for their already existing orphanage as well as a hotel business to support the orphanage and future facilities in the plan. As an intern, I was tasked with designing the hotel business, with supervision from my staff leader and the project architect.

As outlined in our meeting with the client ministry, the next phase of the project is a primary and secondary school to provide education for the children of the Life Is Hope orphanage, as well as children in the community of Croix des Bouquets. Haiti is in the midst of implementing strategies to improve the education system of their country—working to increase the availability of free, quality public education for all. Their hope is to meet what they believe to be the basic right of education for a Haitian citizen, improving their nation’s literacy rate and quality of life. Looking towards this same goal, Life Is Hope’s vision for the Croix des Bouquets community hopes to provide quality education in a safe environment with the space and the resources to encourage growth and supplement the learning experience.
With both national and client goals in mind, I designed the primary and secondary school, focusing on spatial needs and sustainable strategies. The details of the design are as follows in this thesis project. The design focus is on the development of a flexible learning environment and strategies that employ passive systems, such as daylighting and ventilation, in an effort to improve building efficiency, lower building and operating costs, and improve student development and performance.

Through research of humanitarian work, sustainable school design, and precedent studies, I developed several design strategies to address the design goals and the strengths of the community and the climate. The layout, form, and orientation of the building address daylight, ventilation, and learning development. Design details—such as a wood shutter window system and a double roof structure—also address daylighting and ventilation as well as student performance. Several studies have shown that daylighting has the capability to improve student performance by twenty percent, and I worked to design a school that takes full advantage of sunlight as a resource. Through all of the strategies I employed, I hoped to bring together a design that will give the students, teachers, Life Is Hope, and the community something they can take ownership of and be proud of. My ultimate goal is to empower them (through design) to empower themselves and develop future growth. The investment of Life Is Hope and the Shiloh Evangelical Association in the community and the kids of Life Is Hope School is a vital part of that empowerment process. Their work through the facilities I have designed are a push for the development and growth of local individuals and the nation of Haiti.
The development of this thesis project was a fun and enlightening culmination of my undergraduate work as an architecture student. My experience as an intern with Engineering Ministries International changed the way I think about design and the developing world. I was able to speak face to face with real clients who had goals and visions and dreams for what their community can become. When client vision, community involvement, and the design process all work hand in hand, true design happens.

What may at first appear to be restrictions and limitations in a project such as this one (where resources are not as abundant as I am accustomed to in the United States) were in fact incredibly interesting and exciting design challenges. I had to rely on design thinking and innovative solutions (based on precedents and existing research) in order to develop a solution, rather than relying on easy fixes that can be done with unlimited resources. I worked from client communication and goals received in meetings over the summer as well as a site the client had planned to purchase for the next phase. I wanted to work on the Life Is Hope School because I wanted the opportunity to continue the work I began with my team this summer. Though the design is for thesis purposes, I enjoyed developing a solution for future growth that further sharpened my design thinking and the way I will approach design and community development in the future.
Works Cited


SITE

Location
Croix-des-Bouquets, Haiti
Petit Bois and Caniere Neighborhood

Climate
Tropical climate that is semi-arid where the mountains in the east cut off the trade winds. Northeast Trade winds bring rain during the wet seasons.

Wind: Northeast Trade Winds with prevailing wind from the east.

Rainfall:
54 inches annually
April-June and October-November rainy seasons

Winter Temperature: 73-88 F
Summer Temperature: 77-95 F

Site
Former okra field in the Petit-Bois section and Caniere Neighborhood of Croix-des-Bouquets, Haiti.

Context
The Site is surrounded primarily by residential dwellings and open fields (mostly okra fields). The adjacent lot west of the proposed school site is the location for the future orphanage and guest house, already designed by Engineering Ministries International in the first visit to Haiti in June of 2013.

Site Conditions
Vegetation includes tall grass and small trees. Soil consists of an 8-10 inch layer of dark, loose, organic top soil over a hard clayey loam. As such, soil is not ideal for drainage of rain water run-off. Soil conditions, local flood plain, and a 1.25 meter grade decrease from south to north necessitate a .3-.5 meter elevation of the school building off the ground to protect it from flooding (as per researched by Civil Engineers while in Haiti).
[Phase 1]
Life is Hope Orphanage + Guest House
Designed by eMiCanada, summer 2013.

[Phase 2]
The Client
Life is Hope (affiliated with Shiloh Evangelical Association). Both are ministries in Haiti. Life is Hope is primarily responsible for the founding of an orphanage sponsored by foreign 501c3 non-profit organizations and the Shiloh Evangelical Association, which is a conglomeration of twenty-three churches in and around Port-au-Prince.

Primary Representative: Pastor Jean Larochel

Target Client for School: Children of Life Is Hope Orphanage and the surrounding community

Client Vision
"To serve the community by providing education, training and medical care and provide the children of Life Is Hope with love, shelter, food, and hope. Life is Hope looks to empower the next generation of Haitians to rise above poverty and apathy."

Project Vision Casting
Primary and Secondary School

Client Specifications:
Orphanage children + community kids
13 classes (grades)
1 grade per classroom
40 students per grade per classroom
560 students
7 grades for primary; 6 grades for secondary
Teachers from surrounding neighborhoods
Design Goals
Meet building program needs.
Provide adequate learning space as a part of a safe, quality learning environment.
Adaptable spaces for the evolving learning process and a wide variety of age groups.
Simple design and simple construction for local contractors and builders.
Low maintenance and low building operation cost.
Thermal comfort
Adequate lighting
Structural strength

Strengths + Opportunities
Warm climate year round allows for unique design strategies.
Prevailing Winds from the East.
Sunlight for daylighting of classrooms.
Student investment in education
Renewed national interest in education and government initiatives to improve the current system and provide free education for all citizens.
Supporting infrastructure to be built prior to school

Design Considerations
spatial zoning
solar orientation
daylighting
acoustics
climate (heat gain)
energy efficiency
school as a campus
visual expression

Benefits of Sustainable School Design
Higher student performance
Daylight is associated with higher student performance (up to 20% better).
Lower Operating costs
Lower operating costs means more funds for other areas, i.e.: instruction and resources. Lighting and cooling are half or more of energy use. Relying on passive forms of lighting and cooling result in huge cost cuts.
Increased student attendance
Combination of student interest, the provision of resources, and an environment not found elsewhere will draw students to the school.
Increased building life
Preventative maintenance is built into a sustainable school (i.e.: simple design and not using too many electrical systems).

Moving Forward:
For Haitian children (and children all across the world), the education they receive can have a huge impact on their perspective and understanding of the world, of others, and of themselves. The goal of Life Is Hope School is to design a school that the students and the community can take ownership of. The opportunity here is for Life Is Hope and the Shiloh Evangelical Association to come alongside the community and invest in long term relationships that empower future generations. Life Is Hope School provides the space and the environment within which to do so.
El-Shaddai School
Location: Bon Repos, Haiti
eMi 2010

Design Influences:
- Layout
- Open air flow
- Design simplicity
- Single Loaded Classrooms
- Responding to Haitian locale and climate

Maria Auxiliadora School
Location: Ica City, Peru
Architecture for Humanity 2010

Design Influences:
- Single loaded classrooms
- Wood slat awnings
- Central gathering/play space
- Fun color pops
- Exterior circulation
- Wood + concrete material use
Gando Primary School
Location: Gando, Burkina Faso
Kere Architecture, 2001

Design Influences:
Use of local materials
Shaded gathering spaces
Exterior circulation
Double roof structure:
  - roof 1: perforated main structure
  - roof 2: elevated shell structure
    allows for ventilation/air circulation
Shutter style windows
  - rotation or awning style opening
  - user flexibility + daylight/ventilation
Square One
Square meterage based on an average of 1.8m² per student. 1.8m² x 40 students = 74 m² minimum per classroom, plus extra space for movement, chalkboard, and space for teacher. Final classroom size is 7m x 10.5. The classroom and structure then become the module with which to move forward.

Concept Development
Concept A
L-shaped wings with approximately fourteen classrooms, oriented around a central courtyard that allows for air flow through building components and school campus.

Concept B
U-shape with central courtyard. Subspaces between each classroom on both levels allow for more gathering spaces and greater air flow. U-shape keeps the campus contained.

Concept C
Moving in a new direction away from more square shaped concepts. Partially inspired by Life Is Hope orphanage design and adjusted to better fit the site. Responds to wind flow from east and allows for daylighting exposure on both north and south facades of classrooms.

Concept C.2
Moving forward with concept C by implementing structure, a roof, second floor outdoor spaces, etc. In taking a step forward and re-evaluating the concept, the design felt flat and uninteresting.

Concept D
Starting to push and pull classroom modules within the structural frame. This starts to create more sub spaces, a more interesting facade, and more exposed classroom surfaces for better air ventilation and more daylighting.
Masterplan

Layout + Orientation
The form of Life is Hope School is specifically geared towards meeting program needs through cost effective design strategies. The form and layout of the school focuses on building off of the classroom component; culminating in a design with a variety of different flex spaces to be used by students and teachers. The idea is to create a network of individual spaces that supplement the classroom and in turn the learning experience. The Southeast-Northeast orientation allows prevailing winds from the east to flow both through the central gathering spaces as well as the classrooms. The orientation in addition to the single loaded wings allow for greater surface exposure for each classroom, resulting in more opportunities for daylighting and ventilation.

Final Site + Building Program:
13 Classrooms
7 primary + 6 secondary
Administrative spaces: Office + Conference room + Staff room
Service spaces: Storage + Janitorial + Restrooms
Outdoor spaces for: Play + Dining + Gathering
Classroom flex space
Garden
**Primary School**

The upper level houses the primary classrooms, counting seven classroom spaces in total. There are two main flex spaces, three smaller gathering spaces, two grassy courtyard spaces, and lots of room to expand into the rest of the site. The large gathering spaces allow for classroom mobility and flexibility as well as a place for kids to dine, play, and do their schoolwork. The lower level is reserved for primary school classrooms as a landscape for them to navigate, allowing them to explore boundaries and develop problem solving skills.

A. Administrative offices + conference room
B. Central flex space, protected from weather and sunlight by wood slat screen systems
C. West courtyard: flex space for play and exploration
D. Large flex space on Southeast corner
E. School community garden
Upper Level: Secondary

Secondary School

The upper level houses the secondary classrooms, counting six classroom spaces in total. There are also three large exterior flex spaces, with three smaller exterior gathering spaces. These allow classroom flexibility for group work and more hands on learning, as well as gathering spaces for dining and social interaction, which is pivotal to the development of the secondary age group.

A. Large flex space on Northwest corner
B. Classroom space, accommodating 40 students plus extra room for teacher's area, chalkboard, and classroom flexibility.
C. Smaller gathering space on Southeast corner
D. Large flex space on Southeast Corner
Early Studies
1. Wood slat opening
2. Light Shelf
3. Wood slat system

Wood Slat Window System
Non-glass, wood slat system allows for greater air circulation to keep classrooms cooler, mitigating the effects of direct sunlight in terms of daylighting and thermal cooling. Default angle of wood slats refract direct sunlight to create a more diffused even lighting for the classroom.

Adjustable Wood Slats
Wood slats rotate, allowing adjustment for the change in sun angle and intensity throughout the day. The slats can also be rotated closed in event of inclement weather or for greater security when school is not being operated. In closed position, air gaps still exist for air circulation and some lighting.

Awning Style Opening
Entire window system slides to create awning style opening. Allows for even greater user flexibility in terms of the amount of light that is able to enter the classroom as well as the amount of airflow for ventilation.

Dual Purpose Awning
Fully open position has the effect of a light shelf, contributing to even, diffused lighting as well as maximum airflow.
**Wall Construction**

Concrete Masonry Unit + Stucco

Concrete masonry is common building practice in the area. Stucco is a very durable, forgiving material. It has a very wide color palette availability and requires little to no maintenance, lowering operating cost. Lighter coloring can help reflect sunlight and keep the school cooler.

**Building Construction**

The school was built on a 3.5m x 3.5m structural grid, using a combination of columns and shear walls in order to ensure structural stability. The system then works off of the classroom module, which is 7m x 10.5m. As such, the building could likely be built in phases if absolutely necessary.

1. Fiberglass reinforced plastic
2. Wood frame roof trusses
3. Perforated concrete base
4. Concrete columns
5. Concrete masonry shear walls
6. Concrete slab flooring
Elevated Double Roof Structure
1. Fiberglass reinforced plastic
2. Wood frame roof trusses
3. Perforated concrete base roof

The base roof structure is perforated, allowing warm air to rise and ventilate out of classrooms, while the secondary roof shell provides protection from inclement weather. The translucency of the fiberglass reinforced plastic shell transmits diffused daylighting into the classroom from above, and the perforations further distill the amount of light that is able to enter. The structure as a whole allows for better ventilation and more daylighting, without the glare and thermal effects that often accompany a skylight. Daylighting through the roof can be especially useful in event of inclement weather when the shutter style windows might need to be fully closed.

Ventilation Strategies

Roof Ventilation
Double roof structure

Aperture Cross Ventilation
Adaptable wood slat window systems

Building Orientation
Southeast–Northeast orientation
Adjusted to prevailing wind from the east

Single-loaded Corridors

Exterior Circulation

Importance of Ventilation
Mitigating thermal comfort without having to rely on electricity or HVAC and playing to the strengths of a stable climate. Ventilation decreases building operation cost considerably. Without reliable electricity, ventilation is necessary to cooling classrooms as a part of creating a more comfortable and stable learning environment.
**Design Strategies**

**Double roof structure**
Filtered, diffused light through translucent shell and perforated base structure.

**Building Details**
Fins around some of the window openings refract light or shade from direct sunlight, which can cause distracting glares that affect the overall lighting of the classroom.

**Wood Slat Shutter Windows**
Adjustable shutter system openings allow user controlled response to the changing orientation of the sun, shading from direct light while transmitting desired diffused lighting.

**Roof Overhangs**
Roof extends out over exterior flex spaces in some areas to provide shade.

**Wood Slat Roof Awnings**
Roof awnings provide shade for exterior spaces while still allowing light through.

**Building Layout + Solar Orientation**
Respond to the path and orientation of the sun throughout the day. Single loaded wings allow each classroom to received daylight from multiple sides, with strategies geared more towards mitigating direct sunlight on the south side and receiving diffused light on the north side.

**Importance of Daylighting**
Daylight is a vast resource for lighting. The warm climate all year long provides the opportunity for a very open plan that can more easily tap into the potential of sunlight as lighting for the classrooms. Relying primarily on daylighting cuts building operating costs significantly, and daylighting has been shown to improve student focus and performance in the classroom.
Design for the Other 90%

"Ninety-five percent of the world's designers focus all of their efforts on developing products and services exclusively for the richest ten percent of the world's customers. Nothing less than a revolution in design is needed to reach the other ninety percent."

95% of designer focus is on the 10% because those 95% likely come from and are educated among the 10%. What we need is not for designers to take on designing for the world of the 90%, but to build up the other 90%; sharing knowledge, investing in relationships, and training the next generation of local and global designers. Invest time in people, not just buildings. Life Is Hope School, and primarily the work that Life Is Hope will do through the school is a step in the process of building up the next generation of Haitians.

Expanding Architecture: Design as Activism

"Service systems that focus on needs based approach can effectively disable communities. Such systems overlook the capacities of citizen organizations to solve local problems and teach communities to focus first on their deficiencies... Shifting the focus from needs and deficiency to strengths and possibilities can empower communities and designers."

Focusing on the strengths of clients and communities is vital to effective design and empowerment. Focusing on the deficiencies merely perpetuates them. Addressing strengths looks at how the community can be a part of the building project, allowing them to take ownership—to feel connected, confident, and empowered to implement future growth. The design process of Life Is Hope School developed through a lens focused on the strengths of the community, the vision driving the project, and the climate.

When Helping Hurts

"While poor people mention having a lack of material things, they tend to describe their condition in far more psychological and social terms than our North American audiences. Poor people typically talk in terms of shame, inferiority, powerlessness, humiliation, fear, hopelessness, depression, social isolation and voicelessness. North American audiences tend to emphasize a lack of material things such as food, money, clean water, medicine, housing, etc."

Again, the goal was to focus on the strengths of the community and the people, the first step in building them up as people with goals and dreams, rather than focusing primarily on perceived physical needs and deficiencies.

Sustainable School Design

"There should be no wrong way to use a classroom just as there should be no wrong way to use a play structure."

"For young children, sensory exploration is a particularly important way they understand their surroundings. Visual impressions and daylighting, fresh air, acoustics, textures of surfaces, and the experience of moving through a school are particularly rich ingredients in the experiences of children."

Richness of environment and flexibility is important to the learning experience. The Life Is Hope School design needed to address the way learning evolves over time, allowing for flexibility in how the space is used. The design should not fully dictate how the classroom has to be used, but suggest how it can be used with room for improvisation and change.