

# IPRO 326

## High School in Pignon, Haiti

### Project Plan

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**Sponsor:** Haiti Outreach IIT Student Chapter

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**Illinois Institute of Technology**

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## **1 Objectives**

The I PRO 326 team's objective for this semester is to design a High School so an additional 400 children will have access to affordable education in the remote town of Pignon, Haiti. We want to assist our partner Haiti Outreach in realizing this goal by providing them technical assistance, project management and costing tools as well as advice and guidelines that will improve their construction techniques.

Our end goal, beyond the specific school that is currently being built, is to design a instructional manual that gives details of how to construct a one classroom module. This module can be replicated to enable a school building of suitable size to be built in any available location in the Central Plateau region of Haiti. Education is regarded as one of the key factors to help alleviate poverty. Our hope is by providing information moor durable buildings will be constructed and the educational opportunities will expand in the. Our secondary goal is to raise funds to enable the project to progress as rapidly as possible.

The design has been developed from sketches produced by students of the small existing high school in Pignon. It comprises of seven classrooms and will be designed in a way such that it can be built with local labor and materials wherever possible. A large generator on the outskirts of Pignon supplies electricity to the town for only 4 hours a day, in the evening. We will investigate the potential to utilize this supply and supplement it with a solar panel electrical system that will work in conjunction with the generator to charge a battery array to power the school. This system will serve to power a water distribution system to supply water to the students, fans to ventilate the classrooms, and the first computer lab in the region, with lighting to enable night classes to be conducted.

During the summer semester, the team has set forth the following objectives:

- Develop the architectural plans for the high school in Pignon
- Complete designs for the solar electrical system
- Complete designs for a water distribution and sanitation system
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- Create a manual detailing how to complete key details in the construction
- Raise funds or receive donations for key aspects of the investigation or for the supply of crucial components

## **2 Background**

In 2006, a group of students at IIT created a student chapter of Haiti Outreach, a non-profit, non-governmental organization working with communities in Haiti to create clean and available water systems and other community development projects. The mission of Haiti Outreach is "To empower the people of Haiti so they're able to improve their quality of life, strengthen their families and become self-sufficient." Haiti Outreach asked the students to aid in the design of a high school for Pignon, a small town in Haiti, currently only served by one school with no electricity or plumbing.

The student chapter decided that the framework of an I PRO provided the best way

to move forward. The needs of the school were laid before the I PRO team, who are now responsible for creating the design and supporting documents. As the team researched and discussed design possibilities, it was determined that creating an instructional manual based on one classroom module would provide the most long-term benefit in Haiti, as it could be used in further school construction by stringing together as many modules as needed.

One of the design considerations is that we not only need to meet the needs of the students, but that the design must also be environmentally friendly as well as able to be easily maintained with little outside support. This means that we must use local construction practices and supplies that can be procured within Haiti or in neighboring Dominican Republic when possible. We also need to be conscientious of the way in which we utilize electricity by using high-efficiency components. Haiti is a low-maintenance culture so all systems that are implemented must require little maintenance and what is required must be easily completed by people with little technical expertise.

It can be difficult to work within the cultural constraints and still come up with a functional design, as we are accustomed to working with modern amenities. The team must attempt to avoid cutting corners and adopting an “It’s good enough for Haiti” mentality as we complete this project. We would also like to see the design implemented and hope to send a team of 4 to 6 students to Haiti to aid in the construction as well as raising the funds to construct the school.

### **3 Methodology/Brainstorming Work Breakdown Structure:**

The roughly 400 high school students in Pignon currently have one small high school with no electricity or plumbing. Haiti outreach has already started work on building a new high school in Pignon to double the capacity. I PRO 326 can support this effort by providing technical and design input to the (already-in-progress) construction of a high school in Pignon. To complete this endeavor, we have broken up into various sub-groups to find the most effective way to build an easy maintainable school in Haiti. Each group will address various problems in this project. A breakdown of the different problems the group is facing, as well methods that will be used to solve the problems, is as follows:

#### **Structure Team**

- Problem: Verifying Structural Soundness of the Building
  - Define Loading Conditions
  - Determine/Design main load carrying system
  - Perform Structural Analysis with defined loading conditions
  - Verify the chosen sizes of different architectural elements
  
- Problem: Unknown compressive strength of concrete
  - Determine standard testing methods
  - Send molds to Haiti to obtain standardized samples for testing
  - Perform crush test

Architectural Team

- Problem: Creating Clear and Concise Guides for Detail Construction for School
  - Design of Details
  - Consultation with Cost Analysis
  - Draw it up!
  
- Problem: Graphic Representation for a Prototypical School Building
  - Architectural Design of Spaces
  - Consultation with Cost Analysis
  - Graphical Construction Sequence

### Electrical Team

- Problem: Determining the power requirements of the school
  - Get specs for lights, fans, computers, water pumps
  - Determine water pumps needed
- Problem: Designing a system to fit those needs
  - Determine products to be used (controllers, etc.)
  - Find appropriate size solar panels, angle
  - Solar panel to battery ratio
  - Draw up wiring diagram

### Costing Team

- Problem: Define costs
  - Using Quantity Surveying Principles
  - Research building material costs
  - Quantity Estimation of each component
  - Cost per quantity
  - Cost per module
  - Overall cost of building
  - Work with subgroups to identify materials needed

### Fundraising Team

- Problem: Currently the high school project in Pignon is lacking sufficient funds to continue:
  - Research companies that might be interested in contributing either funds or materials to the project
  - Make a fundraising packet to send out to companies (which includes a letter explaining the project, as well as a flyer that has pictures from Haiti).
  - Contact the companies to try and establish connections with potential benefactors.
  - Host fundraising events to raise awareness and attract donors.

## **4 Expected Results**

Our goal by the end of the semester is to compile all of our work from the different sub-groups and design a manual that gives detailed instructions on how to build one classroom. The manual will include the architectural and structural design, as well as instructions for any electrical and plumbing installation. We hope this manual can be used not only for the initial building of the high school in Pignon, but for construction of schools in any impoverished area in Haiti. Our primary deliverables are our plans for the building under construction and the instructional manual for the prototype building and spread sheets which will help in future cost estimation and control.

**5 Budget**

Site visit to gain information and demonstrate construction methods	\$528
Fundraising supplies (printing postage)	\$100.00
Material testing molds and transportation	\$200.00
<b>TOTAL</b>	<b>\$700.00</b>

**6 Schedule of Tasks and Milestone Events**

**Under Construction Building**

1. Architectural group
  - a. Drawings
    - i. Redline finished drawings by July 5
2. Structural Group
  - a. Get Molds and begin materials testing.
  - b. Structural analysis of two story building and its feasibility. July 24
3. Electrical
  - a. Size component selection. July 12
  - b. Wiring diagram / plan. July 24
  - c. Installation guide. July 24
4. Plumbing
  - a. Plumbing drawings. July 24
  - b. Design specs. July 12
  - c. Component specs. July 12
5. Costs
  - a. Excel sheet cost generator with estimate and summery. July 10
  - b. Collection of all spec sheets. July 24
6. Fund Raising
  - a. Letter templates asking of money or products. DONE
  - b. List of companies. DONE
  - c. Mailings. July 12
  - d. Poster. DONE

**Instructional Manual**

1. Architectural Group
  - a. 3d rendering
2. Structural Groups
3. Electrical Group
  - a. Lists of appliances and loads

- b. Showing how to design / set up a power room
- 4. Plumbing
- 5. Costs
  - a. Excel sheet cost generator with estimate and summery. July 19
  - b. Collection of all spec sheets. July 24
- 6. Fund Raising
  - a. Letter templates asking of money or products. DONE
  - b. List of companies used. DONE
  - c. Poster. DONE

## **7 Individual Team Member Assignments**

### 7.1 Overview

<b>Group</b>	<b>Name</b>	<b>Role</b>	<b>Major</b>
01 Architectural	Franklin, Casey	Working Drawings	Architecture
	Lowe, Scott	Working Drawings, Liaison between Architectural and Structural Groups	Architecture
	Jaromin, Sebastian	Working Drawings, Plumbing Drawings w/ Mechanical Group	Architecture
	Watkins, Brett	Working Drawings	Architecture
02 Structural	Diaz De Leon Orraca, Federico	Material Testing	Architecture
	Velichkov, Veselin	Building Design	Civil Engineering
03 Electrical	Dike, Chukwuderaa	Solar Panel/Electrical System Design	Electrical Engineering
	Igbokwe, Chinedu	Solar Panel/Electrical System Design	Electrical Engineering
04 Mechanical and Plumbing	Hogan, Brian	Water Sanitation, Septic System Design	Chemical Engineering
05 Quantities and Costing	Kirsch, Joseph	Data Organization	Architecture
06 Fundraising	Bailey, Nicholas	Fundraising, Electrical System Design	Mechanical Engineering
	Goldsmith, Katie	Fundraising, Minute Taking, Overseeing Reports and Presentations	Psychology
	Samuels, Janina	Image Preparation	Architecture
	Williams, Allisyn	Image Preparation	Architecture

7.2 Sub-teams

<b>Architectural</b>		
<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Franklin, Casey	Sub-team leader	Overall
Lowe, Scott		Working drawings
Jaromin, Sebastian		
Watkins, Brett		

<b>Structural</b>		
<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Velichkov, Veselin	Sub-team leader	Overall
Diaz De Leon Orraca, Federico		Material testing

<b>Electrical</b>		
<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Dike, Chukwuderaa	Sub-team leader	Sizing components for building, wiring and installation guide
Igbokwe, Chinedu		Sizing components for building, wiring and installation guide

<b>Mechanical and Plumbing</b>		
<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Hogan, Brian	Sub-team leader	Overall
<b>Quantities and costing</b>		

<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Kirsch, Joseph	Sub-team leader	Overall

<b>Fundraising</b>		
<b>Name</b>	<b>Role</b>	<b>Responsibilities</b>
Bailey, Nicholas	Sub-team leader	Letter templates, contact host companies, helping electrical team
Goldsmith, Katie		Contact host companies, design fundraising poster, minutes
Samuels, Janina		Contact host companies, design fundraising poster
Williams, Allisyn		Design fundraising poster, image control, contact host companies

### **8 Designation of Roles**

Due to the fact that we are completing most of our work in sub-teams, we do not have overall roles for the team. To keep organized we decided to hold a brief meeting every class period where every sub team gives a status update. Katie Goldsmith will take minutes at these meetings.