IPRO 327: Sustainable Water Distribution System in Pignon, Haiti

Project Plan

1. Objectives

Our objectives for the semester are:

- Produce or procure a topographical map of Pignon, Haiti
- Map the current structures on a topographical map
- Design a preliminary water distribution system
- Work with Haiti Outreach to foster relations between IIT, the organization, and the community of Haiti
- Raise funds to cover partial costs of trips to Haiti to gather data

2. Background

This project was originally proposed by Tim Winters (IIT, December 2006), as an extension of an Engineers Without Borders (EWB) service project. Pignon is a city in central Haiti, with a current water distribution system in need of repair or redesign.

In the summer of 2006, a preliminary team of EWB students went to Pignon with David Baker, the Vice President of External Affairs for IIT. They determined that the project had enough merit to become a full IPRO, and not simply a project by EWB. Also, the timeline is somewhat sketchy, but sometime in here, IIT students began working with a non profit organization called Haiti Outreach, who is now our biggest contact. By the time the trip was over, it was too late to propose for an IPRO for the fall semester of 2006, so the proposal was submitted for the spring semester of 2007.

The last few months of 2006, the student group of Haiti Outreach IIT was formed. In collaboration with Haiti Outreach, three IIT students went to Haiti in January of 2007 to begin preliminary data gathering. Mark Taylor, an architecture graduate student, did site mapping of a lot of the town. David Williams, an undergraduate student, and Alex Miot, a graduate student, both from the Civil Engineering Department, did preliminary surveying of the town. They also gathered global positioning data (GPS) of many of the important landmarks around town.

The current water system has many faults. The pump used currently can fill the cistern once every five days, after which the water is drained and sent to the fountains throughout the city. There are very few houses directly connected to the system. Also, the current system is not pressurized, so there is no way to turn the public fountains off when full; they keep overflowing as long as there is water.

Our plan is to improve the pump system and design a system that can be pressurized in the future. Because of the economics of the region, it is impractical to design a system that directly connects to all houses. Therefore, we plan to enlarge the current fountain

system so people do not walk as far. Also, one key feature we wish to add is fountains that stop filling when a certain level is reached.

This method was chosen for a combination of reasons. One of the foremost reasons is that our contact in Haiti believes this to be the best system. Also, as this area continues to grown and become modernized, a simpler system will be much easier to update.

The only other objective that needs some explanation is fundraising. Haiti Outreach is raising the money to finance construction of the system. We have to pay for all of our own expenses in going to Haiti to gather information. Also, any equipment that needs to be rented or bought needs to be paid for by our organization.

3. Methodology

We identified that the best way to accomplish our many objectives was to split into groups, as identified below:

Group 1	**Group 2**	**Group 3**	**Group 4**
✓ David Durra ✓ Mark Rokita ✓ Shawn Shoulders ✓ Eric Radliff	✓ Ermin Skrebo ✓ Amy Sissala ✓ Alex Kircher ✓ Garret Forkan ✓ Joel Zook ✓ Nate Hollister ✓ Kinjal Tailor	✓ Chi Tam ✓ Chon Pong Chung ✓ Alayna George ✓ Shoiab Ratnani	✓ Joshua Sullivan ✓ Ivan Rasic ✓ Ashfaq Mohammad ✓ Piotr Sawulski ✓ Matt Ballog ✓ David Williams ✓ Ben Susek

Group Assignments:
Group 1: responsible for producing a topographical map that the design team can use for their design. Also, integrate end user group info into map format where applicable.
Group 2: map existing structures, also determine the needs of the people of Haiti.
Group 3: manage and/or produce all IPRO Office Deliverables. Also, fundraise money to pay for trips and needed equipment.
Group 4: design the preliminary system.

We have identified the following tasks as being the starting points for our project:

Group 1: Topographical Mapping	**Group 2: Site Map, Existing Structures, End User**	**Group 3: Fundraising and Administration**	**Group 4: Design**	**Spring Break**
Convert collected data	convert site map to topo map: 40 hrs	Get Funding: 60 hrs	Research pumps and	Survey needed

into topographic maps: 100 hrs			fountains: 30 hrs	points: 40 hrs
Make other useful maps 30 hrs	estimate population: 20 hrs	Keep Accounts of all money received: 30 hrs	Identify and acquire needed software: 10 hrs	Locate current fountans, pipes: 10 hrs
Prepare list of needed data for next trip to site: 10 hrs	Determine average Haitian water usage: 25 hrs	Keep up to date with all deliverables: 40 hrs	Design pump improvements: 20 hrs	Examine link from source to pump, pump to cistern: 15 hrs
Collaborate with design team on what file type needed for maps: 2 hrs	Required v. Current Capacity: 40 hrs	Inform team of deadlines: 5 hrs	Work with End User Group on current system issues: 30 hrs	Examine other possible water sources: 20 hrs
Deliver useable maps to design team: 5 hrs	Identify locations of existing fountains and wells: 25 hrs	Help organize trip: 10 hrs	Design pipe network path: 35 hrs	Check water quality: 10 hrs

4. Expected Results

Our expected result by the end of the semester:

- Auto-CAD (or equivalent) preliminary design of system
- Set of topographical maps, including existing sites, that can be used in the future
- Raise at least $10,000 to finance this semester and future endeavors

This addresses the solution because with these results, the system will be ready for review and construction, hopefully by the end of this calendar year.

5. Project Budget

Our estimated budget:

Expenditure	Estimated Cost	Estimated Date
Software	$100	1-Apr-07
Trip per person	$1,000	11-Mar-07
GPS Equipment	$1,000	11-Mar-07
Letter Mailings	$50	26-Feb-07

Currently there are 4 students interested in going on the Spring Break trip, each of whom will pay $400. The IPRO Office is providing generous support. We are also going to have a fundraising event in April with the president of Haiti Outreach coming to IIT.

6. Schedule of Tasks and Milestone Events

Task	Group	Start Date	Deadline
Project Plan	3	02/06/07	02/16/07
Preliminary Design	4	01/16/07	02/19/07
Convert data to map	1	01/16/07	02/27/07
List of needed data	1	01/16/07	02/27/07
Decide file type	1	02/06/07	02/27/07
Deliver maps	1	01/16/07	02/27/07
Estimate Population	2	01/16/07	03/08/07
Identify software	4	01/16/07	03/08/07
Determine water needs	2	01/16/07	03/22/07
Identify existing structures	2	01/16/07	03/22/07
Research pumps	4	01/16/07	03/22/07
Midterm Report	3	02/23/07	03/23/07
Rework Design	4	02/20/07	03/29/07
Minutes	3	01/16/07	04/06/07
Make other maps	1	03/20/07	04/19/07
IPRO Day Deliverables	3	04/09/07	04/20/07
Keep track of money	3	01/16/07	04/25/07
Get funding	3	01/16/07	04/25/07
IPRO Day Presentation	3	04/09/07	04/25/07

The major milestone events are the production of maps partway through the semester as well as the preliminary design of the system. The IPRO Day Deliverables include poster and abstract.

7. Our Team

Our faculty advisor is Arthur Kyrzydlo, from the Civil Engineering Department.
Our team members:

Name	Major	Why This IPRO?	Skills
Alayna George	Molecular Biochemistry and Biophysics	I love service learning, and wanted to work on a different project	communication, IPRO experience, networking skills

Alex Kircher	Architecture	I am interested in this project	design and draw
Amy Sissala	Architectural Engineering	Member of EWB and related to major	computer programs, plumbing
Ashfaq Mohammed	Architecture		
Ben Susek	Liberal Arts/Mechanical Engineering	Practical beneficial outreach; this IPRO will help the people of Haiti. I have been involved with similar projects in Honduras	Design of pump and pipe systems
Chi Tam	Civil Engineering	I like the topic	hydraulics, hydrology, AutoCad
Chun Pong Chung	Civil Engineering	Advisor Recommended	fluid mechanics
David Durra	Civil Engineering	I chose this IPRO because I wanted to get practical design experience for water systems	hydraulics and fluid dynamics
David Williams	Civil Engineering		
Eric Radloff	Civil Engineering	I have experience with water systems, and this is related to my major	hydraulics, hydrology, fluid mechanics, water distribution systems
Ermin Skrebo	Architecture		
Garret Forkan	Civil Engineering	Applicable to my major	hydrology and fluid mechanics
Ivan Rajic	Architecture	I chose this IPRO because it seemes like and interesting project to take on due to all the planning and development that must go in it.	Computer, planning, and design
Joshua Sullivan	Mechanical Engineering		

Kinjal Tailor	Aerospace/Mechanical Enginnering	Related to major and it seems very interesting	general engineering skills
Mark Rokita	Civil Engineering		surveying, fluid mechanics, hydrolics
Matt Ballog	Civil Engineering	It's something I want to do fulltime	hydraulics, hydrology, AutoCad
Nathaniel Hollister	Architecture	I was involved with Haiti Outreach, and knew the professor	organization, design
Piotr Sawulski	Civil Engineering		
Shawn Shoulders	Aerospace Engineering	Because I feel that the end product (water system) is something that will actually help people	communication, working with others
Shoaib Ratmani	Civil Engineering	I want to contribute to the people of underdeveloped countries and learn about water reclamation systems	fluid mechanics, pumping systems, hydraulics

We also have Mark Taylor and Alex Miot, IIT graduate students, as advisors to our project.

8. Assigned Roles

Assigned Positions:

- Team leader is David Williams
- Secretary (minutes taker) is Chi Tam; he is also responsible for the management of iGroups, summary of weekly tasks, and organizing and filing timesheets.
- IPRO Liaison is Alayna George
- Subteam 1 Leader: Shawn Shoulders
- Subteam 2 Leader: Alex Kircher
- Subteam 3 Leader: Alayna George
- Subteam 4 Leader: Matt Ballog

The purpose of each of the subteams has already been discussed.