



Document 521
PRE-ASSESSMENT REPORT

CHAPTER: **Northeastern University**

COUNTRY: **Honduras**

COMMUNITY: **Yoro District**

PROJECT: **Water Project**

TRAVEL DATES: **December 12th, 2010 –
December 23th, 2010**

PREPARED BY

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1.0 Contact Information

	Name	Email	Phone	Chapter
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Design Lead	Megan Fritz	DesignLead.Honduras.EWBNEU@gmail.com	781-307-3629	EWB-NEU
President	Matt Walsh			EWB-NEU
Mentor #1	Daniel Saulnier			EWB-NEU
Mentor #2				
Faculty Advisor (if applicable)	Ferdinand Hellweger			EWB-NEU
Health and Safety Officer	TBA			EWB-NEU
Assistant Health and Safety Officer	TBA			EWB-NEU
NGO/Community Contact	Dean Sibert			ACTS
Education Lead	Suzanne Eisenberger			EWB-NEU

2.0 Travel Team

Name	E-mail	Phone	Chapter	Student or Professional
Daniel Saulnier			Boston	Professional
TBA			NEU	
TBA				

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3.0 Travel History

Dates of Travel	Assessment or Implementation	Description of Trip
August 2005	Assessment	El Tecuán Project
April 2006	Implementation Assessment	El Tecuán Project Los Planes Project
April 2007	Phase IA Implementation	Los Planes Project
December 2007	Phase IB Implementation	Los Planes Project
April 2008	Phase II Implementation Assessment	Los Planes Project El Chaguite Project
December 2008	Phase I Implementation	El Chaguite Project
April 2010	Phase II Implementation	El Chaguite Project

4.0 Program Background

The Honduras Design Committee of the Northeastern chapter of Engineers Without Borders has focused its efforts in the Yoro District of Honduras for the last five years. To date, EWB-NEU has brought water to over 600 people. The team has completed a total of seven trips to the region since the start of the program, including two assessment trips and five implementation trips.

EWB-NEU has already completed projects in El Tecuán, Los Planes, and El Chaguite. EWB-NEU started in El Tecuán in 2005 alongside Americans Caring Teaching Sharing (ACTS). After the initial assessment trip, EWB-NEU returned to El Tecuán to conduct repairs and upgrades on a major section of the water distribution system. These repairs restored reliable water service to a major portion of the village.

The second project was located in the village of Los Planes, and was separated into multiple phases. The first phase consisted of the installation of a new pipeline to the village from the most reliable local water source. This pipeline traverses a large vertical distance and several ravines. After Phase II was completed, the distribution was fully functional with taps in all of the homes.

In El Chaguite the team designed a new system, including transmission and distribution systems as well as a water storage tank. The El Chaguite Project was designed to include a tap in each house, the school, and at both churches. Phase I consisted of a new transmission main. Phase II included the construction of a 6,500 gallon water storage tank and distribution system.

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5.0 Trip Overview

The primary purpose of EWB-NEU's December 2010 Assessment trip to the Yoro District of Honduras is to investigate several villages in the area surrounding El Rosario. The potential project locations as identified during the El Chaguite Phase II Implementation trip (in April 2010) are the villages of Los Oreos, El Carrizalito, El Rosario, La Concepción, and Santa Rosa. These villages will be evaluated, and any information collected will be carefully documented and analyzed for use during future designs. The goal of visiting these villages will be to determine which village EWB-NEU will work with for its next project. Post-assessment analysis will involve the evaluation of each village on the basis of feasibility and other factors which are described in the Project Feasibility section.

6.0 Project Location

Latitude: 15°16'41.00" N
Longitude: 87°19'25.50" W

7.0 Objectives of Site Assessment

EWB-NEU has several objectives for the assessment trip; one is to follow up with past projects, including the most recent project in El Chaguite. EWB-NEU wants to be sure the tank and distribution system that was constructed is functioning properly. If everything in El Chaguite is running smoothly, the team will focus its energy on assessing a new project location.

Another purpose of the trip will be to visit villages where future projects may be undertaken. The team has several potential project locations; El Carrizalito, La Concepción, Los Oreos, El Rosario and Santa Rosa. The team will then select one village in which to do a full assessment. Enough information will be gathered to complete a design when the group returns to Northeastern.

If time permits, the team will visit Los Planes and El Tecuán, the group's two other past projects. EWB-NEU would like to make sure their Water Boards are taking care of the water systems and do follow-up health and community surveys.

The team will also meet with El Rosario's Water Board to see what assistance they may require and to keep up with local events. EWB-NEU stays in a bunkhouse owned by ACTS in El Rosario; as this village is our home base we like to keep a strong relationship with everyone there and address any concerns they may have.

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7.1 SCHEDULE OF TASKS

Activity	Required Timeframe (Days)
Travel from Boston to San Pedro Sula	1
Purchase Supplies in San Pedro Sula, Drive to El Rosario	1
Re-visit El Chaguite to follow up on new tank/system	2
Re-visit El Tecuan and Los Planes Projects	1
Visit and Speak with Residents of El Carrizalito	1
Visit and Pre-Assess La Concepción	1
Visit and Pre-Assess Los Oreos	1
Visit and Pre-Assess Santa Rosa	1
Work with El Rosario Water Board	.5
Select and Fully Assess 1 Village	2.5
Travel from San Pedro Sula to Boston	1.5
Total	13.5

8.0 Project Feasibility

EWB-NEU team members will travel to each of the villages within the first few days of the trip. An assessment of each village will be made to determine where EWB-NEU can be the most effective. This determination will be based on three main factors: the severity of the situation in each village, the feasibility and scope of each project, and the capacity of the village to maintain the system after implementation. After making this initial determination EWB-NEU members will focus on one village, performing a more in depth study of its needs.

When determining the feasibility of a project, there are several points that must be taken into consideration. The most important points pertain to the EWB-NEU team possessing the necessary knowledge and expertise to be capable of completing the project. This entails making a preliminary outline of the tasks that will need to be completed for the project. It also includes looking into each section of the project, from surveying, initial design and review, to implementation for each phase of the project. So long as a project is financially feasible the design can be achieved. In the academic university environment, if design advice is required, group members often turn to professors or professionals to establish a system which can be implemented thousands of miles away.

EWB-NEU will also explore the cost of the potential projects. This includes purchasing the necessary materials (as well as any foreseen unique and/or expensive materials), hiring any skilled laborers (e.g., a mason), delivery costs, and transportation. EWB-NEU will determine if the expected costs of a project are in range of the group's available funds.

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Another important factor that must be considered is how much time the project will take. How many phases should the project be broken into, and how long would each phase take to design and then implement? Does EWB-NEU have enough people to work on the design to complete it in a timely manner? Would the travel team be able to reasonably complete the necessary tasks to begin implementation of a design in the allotted time for one trip, after which point the village and/or a hired laborer could continue work on the project unassisted?

It is also important that the magnitude of the project be analyzed in terms of how much physical labor is required to complete each phase of the project before the next travel date. Once this is determined, EWB-NEU will make sure that there are sufficient villagers to match the magnitude of the project. Additionally, it is important to assess how enthusiastic the villagers are for the project. It is important that they have a vested interest in completing it in a reasonable amount of time.

There are several other important factors that relate to the value of the project which will also be considered. The most influential factor is the impact that this project will have on the health of the community. How much will it improve the lives of the villagers in terms of reducing disease rates? How will the standards of living be improved? How many people will it affect? After examining these factors, EWB-NEU will compare them to those related to feasibility and examine the pros and cons of the situation. For example, if there is a large cost associated with the project but it will greatly improve the lives of many people, there is a greater reason to pursue the project.

9.0 Community Information

9.1 Description of Communities

EWB-NEU has identified several villages that may be in need of assistance. Many of the villages in the Yoro District either have no water system or have an existing system that is in need of repair. Water distribution is extremely important because it allows villagers easy access to a controlled water system.

El Chaguite:

The first village to visit while in Honduras is El Chaguite. This is the latest village where EWB-NEU has implemented a water distribution system. The purpose of this visit is to make sure the distribution system and storage tank are complete and running smoothly. Once EWB-NEU is sure the water system is working properly, the team will continue to assess other villages in order to decide where the next project will be.

Los Oreos:

Los Oreos is a very poor community close to La Reinada, consisting of ten widely dispersed homes. The homes are scattered across an area of about 30 acres on very high ground. The

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people living in this village moved there in hopes of sending their children to school in La Reinada. They currently have a limited water system which services only a couple of the villages' homes. The other homes do not have any flow because they are too poor to pay the water tax that is necessary to continue its upkeep. One home has a spigot, but other families don't have access to it, so they have to walk a great distance over difficult terrain to obtain water.

El Rosario:

El Rosario is a large village with a population of approximately 900 people. El Rosario has been very hospitable to EWB-NEU over the years by letting the team stay in a bunkhouse in their village during trips to other local villages. El Rosario has an existing water system but it is badly in need of some repairs. The village has a water storage tank, however it appears to be undersized, poorly located, and in need of some structural repairs. The villagers are anxious to begin repairs on their system and tank. Also, the village has recently had a shortage of water because some of the water from their source is overflowing instead of being properly directed into the distribution system.

La Concepción:

La Concepción is a village of about 300 people. The village has electricity, a school, a church and an existing water system. Their existing water system was built by the government organization SANAA (Servicio Autonomo Nacional de Acueductos y Alcantarillados; *translated* National Autonomous Service of Aqueducts and Sewers). The source is a stream coming from a mountain above the village. They have a dam that collects this surface water and directs it into a piping system. The pipe system has a severe build-up of sediment and calcium deposits which is slowly clogging the pipes and will eventually render the system inoperable. This is likely due to the open, non-filtered source of water which flows into the collection tank. EWB-NEU tested the water at a single household tap on the April 2010 trip, and the sample contained various bacteria including *E.coli* and fecal coliforms. The water system is in need of repair and, potentially, treatment.

El Carrizalito:

El Carrizalito is a village of about 33 homes and 150 people. The village's water source is located below the elevation of most of the homes, which prohibits the gravity fed water system typical to the region. Since the water system cannot be gravity fed, another option may be to use a powered pump system. EWB-NEU has been researching different types of pumps, ranging from diesel to solar powered, that could be potential solutions. Another potential option is to provide water storage at the source site in order to ease demand and waiting time during peak usage. The team already has some detailed survey and GPS data of the village, as well as a health assessment.

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Santa Rosa:

Santa Rosa is a village located near El Chaguite. On the April 2010 trip to El Chaguite, a representative from Santa Rosa asked the team to visit their village. He stated that a water project had recently been implemented, but that it was a failure, and he hoped that the team could offer advice or assistance.

9.2 Community Partnerships

The villagers provide great assistance and input throughout the entire project process. They are very hard workers and are enthusiastic about bringing water to their village. EWB-NEU trains the villagers how to build and maintain their water system, including such techniques as pipe laying and concrete mixing. The villagers are also responsible for the physical labor involved in the implementation, including trench digging, material transport within the village, etc. Members of the Water Board are in charge of maintaining the water distribution system and collecting water taxes from each household. They play an integral part in the development of the water system so they can learn how it operates and how to maintain it. Without the help of the local villagers, none of the projects EWB-NEU has worked on would be completed. The EWB-NEU team stays in communication with the village via letters and phone calls, keeping the Water Board actively engaged and involved in any design and implementation plans and decisions.

9.3 NGO Partnerships

EWB-NEU has been very fortunate to develop a close partnership with the non-profit organization Americans, Caring, Teaching, Sharing (ACTS) while working in Honduras. ACTS is an organization that focuses on community development. The EWB-NEU team always learns a lot from ACTS' experience. ACTS also allows EWB-NEU to stay in their bunkhouse and hire their capable local staff. They keep the group up to date with local happenings.

ACTS introduced EWB-NEU to another non-profit organization, Sustainable Harvest International (SHI). SHI focuses on training farmers in sustainable and economical agricultural techniques. Before SHI can work in a village there must be a consistent flow of water that can be used for agriculture.

By combining resources with ACTS and SHI, EWB-NEU is able to help many more people. As soon as a village has enough water, SHI shows the people how to grow vegetable gardens. With water, ACTS can teach people about personal hygiene, including dental care, etc. There are many more opportunities for improving the quality of life for people once they have water.

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10.0 Data Collection and Analysis

10.1 Site Mapping

A critical step in assessing a village for a gravity fed water system is accurately mapping and collecting elevation data for key features in the village (water sources, homes, tank sites, etc). The team will use a GPS unit to map key points in the village, including possible source locations, houses, public tap locations, tank locations, and distribution paths. The GPS allows for the collection of a large number of data points relatively quickly. Since the elevation data from the GPS is not particularly accurate, the team will survey the area using a Total Station as well to acquire more accurate elevation data. The GPS data points will be used for horizontal-plane control, while the Total Station will provide very accurate elevation data (vertical control). Also, the team will map and check the condition of any existing system.

10.2 Technical Data Collection

To collect GPS data, the team will use a rented GPS system, and record coordinates with a Trimble GeoXT data collector. For surveying, the team will use a TOPCON GTS-226 total station. Points will be manually recorded and checked. Points of interest are potential water sources, houses, hills, valleys, and paths. EWB-NEU will verify our GPS data by comparing GPS points, elevations, and distances with those from surveying, which is more repeatable and much more accurate in the vertical plane.

The team will also measure the flow rate of any available sources by a v-notch wier or with a timed flow-nalgene test. The data collected will be used to determine project feasibility in each village, and also for the future design of the system.

The team will perform water quality testing at possible sources as well as from other water supplies and exiting systems if present. The group will test for fecal coliform with Coliscan Easygels, using a portable incubator supplied by power at the ACTS bunkhouse. Additional testing will be performed for pH and hardness using a 5-in-1 test strip from Aquacheck. Turbidity will be measured with a turbidity tube, if one is available to the group.

In addition to collecting technical data necessary to design a system, the team will also speak with as many the households in the village(s) selected for a full assessment as possible. The group will conduct a brief health assessment of the villages that are under consideration in order to get a better idea of the existing situation and to establish a baseline of health for later comparison. The team will also conduct a community census to better understand the needs of the village. The group will ask the villagers about local resources, skills, and how many people would be available for labor on a given project.

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10.3 Monitoring and Evaluation of Data

EWB-NEU will use the initial health survey data for future follow-up analysis of the village's health and overall living conditions. This comparison will give the group an idea of the impact of the project, and its effectiveness in promoting the community's growth and wellbeing.

11.0 Budget and Funding

11.1 Estimated Trip Expenses

Item	Expected Cost
Airfare	\$3,600 (\$600 pp)
Rental Truck	\$1,395
Gas	\$145
Hotel	\$400
Food and Water	\$500
GPS Rental	\$1,000
Miscellaneous	\$800
Hired Help	
Guides	\$170
Cooks	\$160
Laundress	\$70
Translator	\$150
Exit Fees	\$250
Total	\$8,640

11.2 Hours

Names	# of Weeks	Hours/Week	Trip Hours	Total Hours
Design Lead	32	16	2 weeks	512 + 2 weeks
Program Director (Alexandra Unger)	32	4	2 weeks	128 + 2 weeks
Mentor (Daniel Saulnier)	32	3	2 weeks	96 + 2 weeks
Other Team Members (5)	32	3	2 weeks	480 + 2 weeks each

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11.3 Donors and Funding

Our funds were compiled from corporate and private donations. The following is a list of all of our funding sources.

Over \$13,000 was donated from the following corporate sponsors in 2010 (through September):

Fontbonne Academy
IBM
T Ford Company, Inc.
Natgun
GZA GeoEnvironmental
Tetra Tech
Vanasse Hagen Brustlin, Inc
Kleinfelder/SEA Consultants Inc.

A total of approximately \$7,500 was raised over the span of January to September of 2010 in private donations from:

Angie Faulise
Larry W Vanderventer
Paula Pelaggi
Gita & Aidis Kupcinskis
Salvatore Marques
James & Marie Devine
Eugene & Sharon Debra
John & Frances Karoff
Louis J Casey
Edmund J Freeman
Edward F. Holmes
Joseph G Manzi
Richard J & Kathleen Scranton
William H Hover
Ryan B Mahoney
G Raymond Luddy
Maria Sarte
Paul, Bernard, and Daniel Saulnier
David, Linda, and Christine Abichaker

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12.0 MENTOR ASSESSMENT

12.1 Mentor Assessment

Prepared by Daniel P. Saulnier, P.E. on October 12, 2010

EWB-NEU has been working in this area of Honduras for five years. The team has built a good reputation in the area by doing quality work, by collaborating with their partner villages, and by maintaining a long-term presence in the area. Furthermore, the students have demonstrated the ability to transfer organizational knowledge from year-to-year as students graduate, and there is a strong showing of new freshmen and sophomores interested in the group's mission.

This Assessment Report reflects the group's experience with past projects and past assessments. The somewhat unorthodox approach of performing preliminary assessments, choosing a project, and performing a full assessment has precedent, as it was the method responsible for the team's recently-completed project in El Chaguite. Although it will necessitate additional data collection on this trip, the exercise has a number of significant benefits to the group. Travel team members will be exposed to a number of villages, each with different needs and resources. This will help the group to begin developing relationships for future projects, and will help individuals on the team to understand the spectrum of existing technologies available for designing solutions. The need for the travel team to make a decision for the larger group provides an opportunity both for planning and setting priorities prior to the trip, and for the travel team members to experience the responsibility associated with making an important decision for the team.

In the coming months, the team will need to focus on three things:

- training travel team members,
- finalizing health surveys and obtaining approval from Northeastern's Institutional Review Board, and
- making final determinations of data needs and priorities for each of the villages.

Team leaders are aware of these outstanding items, and I am confident that they will complete them before the trip begins. It remains an honor for me to work with such a committed and talented group of students.

13.0 Health and Safety

A detailed Health and Safety Report is submitted under separate cover.

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13.1 Travel Safety

13.1.1 Department of State Travel Warning/Alert and International SOS Travel Risk Ratings

There are no current travel restrictions or warnings by the U.S. State Department pertaining to Honduras according to their website (below) as of October 1st, 2010.

http://travel.state.gov/travel/cis_pa_tw/tw/tw_1764.html

13.1.2 Point-to-Point Travel Details

Based on previous travel experience in Honduras, travel to El Rosario, Honduras will take about two days. On the first day, the team will take a shuttle at 5 AM to Logan Airport in Boston, MA, and catch a connecting flight in Miami, FL (or Houston, TX) which continues onto San Pedro Sula, Honduras. A pickup truck is rented at the airport, which is used for transportation in-country during the trip. The team will spend the first night in San Pedro Sula, and then drive to El Rosario in the early afternoon of the second day. The drive from San Pedro Sula to El Rosario is typically a four-hour trip. All travel between villages and the bunkhouse in El Rosario will be by truck. The team will then drive back to San Pedro Sula on the penultimate day, spend a night in the hotel, and depart from San Pedro Sula Airport at 2 pm on the last day of the trip.

13.1.3 On-the-Ground Contact

EWB-NEU will maintain safe travel by: being smart, traveling with knowledgeable and well-respected guides, and keeping helpful contacts within the cities and villages. The team is well-known and respected in the Locomapa and Yoro areas, and the guides who work with the team on a daily basis are also esteemed and very knowledgeable about the areas in which we work. The team will have a minimum of one cell phone. Local residents have cell phones which can be used to get in touch with the team. The team has provided EWB-USA with a contact list of numbers for the group in the US and on the ground, which is also available through EWB-NEU.