Water Resource Development—Valle Escondido, Panama

Project Background

Student teams spent two weeks in Panama, most of which was in indigenous villages collecting data for analysis during the fall semester. Groups of 4-5 students went to villages throughout the country, each with a unique problem to assess. 'Todo Debe Engineering' went to the village of Valle Escondido.

Figure 1. Bocas del Toro, Panama - Valle Escondido

Community Background

- Isla San Cristobal, Province of Bocas del Toro
- Indigenous Ngöbe community
- Population of ~300 people
- Income: Agriculture
- 4th Peace Corps Volunteer

Current Problem

- Sediment in Water Supply
- Contamination of Current Sources
- Lack of Source Diversity

Data Collection

- Survey of Aqueduct
- 3M Petrifilm & Nitrate Tests
- Pressure/Pipe Size/Tank Assessment

Figure 2. 3M Petrifilm - High E. coli

Design

Rainwater Catchment

- 85 Gallon Ferrocement Tank
- Wooden Stand
- PVC Gutter Pipe for Water Collection
- Mesh Filter removes large roof debris
- First Flush System removes smaller roof contaminants

Figure 3. Sample Tank In Community

Spring Box

- Protect spring source from runoff contamination from agricultural development upstream of the spring
- 2 springs currently in use; 1 newly constructed spring
- Rebar reinforced concrete isolates spring water from surface
- Integrated open side and open bottom to allow ground flow from beneath as well as from uphill drainage.
- Outflow, overflow and sediment drainage pipes
- Ridged access lid to prevent surface seepage and allow interior maintenance

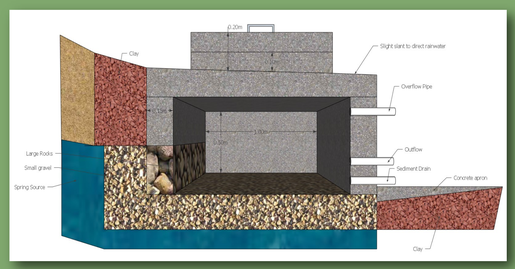

Figure 4. Proposed Spring Box Model

Aqueduct Expansion

Current System

- 17 of 30 homes are connected to the aqueduct, taps in each home
- Supplemental water comes from nearby surface wells
- Nonexistent water treatment
- Unburied/Broken pipes allows contaminants to enter

Proposed System

- Connect all 30 homes to aqueduct system
- Eliminate use of water from surface wells
- In-line chlorinator for water treatment
- Bury/ Replace piping to prevent contamination from entering

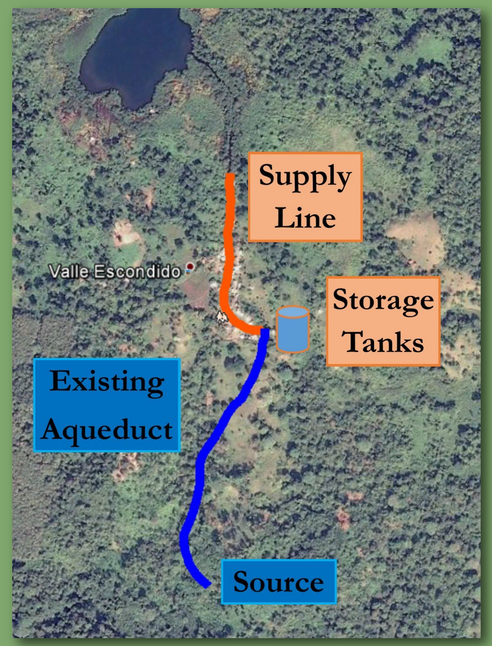

Figure 5. Existing Aqueduct

Storage & Treatment

Tap Stand

- Provide protection and stability of PVC supply lines connecting to homes

Chlorinator

- Constructed of 4" PVC (Figure 6)
- 3" PVC insert with holes
- Insert contains calcium hypochlorite tablets

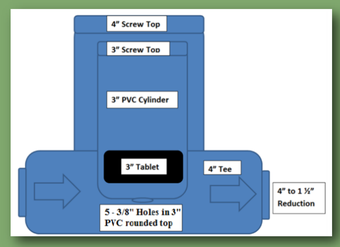

Figure 6. In-Line Chlorinator

Cost Estimate

Components - Most Expensive

- Spring Box: Concrete
- Aqueduct Expansion: PVC Piping
- Rainwater Catchment: Concrete
- Total - $9300 USD

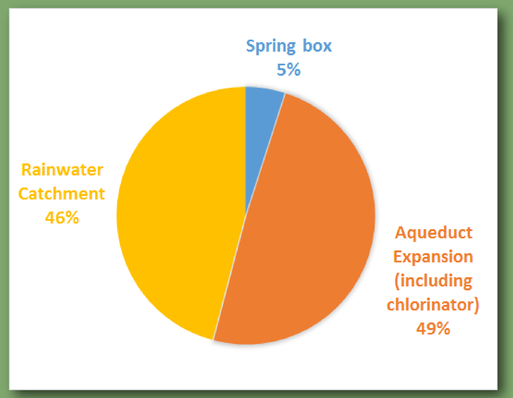

Figure 7. Budget Breakdown

International Senior Design 2015

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