Team (H_20)nduras

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Introduction

Team 1 has partnered with a PhD student at the University of Illinois to design a water distribution network for a rural community located in Yamaranguila, Honduras known as Las Rilles. Situated on the side of a mountain, this town houses 37 families, a school, and a church. By creating a unified water distribution system, the entire community will gain access to safe water without having to leave the comfort of their home. It should be noted that the scope of this work is primarily theoretical but will serve as a starting point for the municipality in order to implement a more refined design in the near future.

Methods

ArcGIS

- Existing houses and terrain elevations based on google earth pro data.
- Created a DEM model using ArcGIS pro.
- Created contours and spatial imagery in the background to use in EPANET modeling.

EPANET

- Survey data from ArcGIS was imported to determine pipe lengths.
- Used to determine pipe sizes and pressure zones.
- Used to verify water storage reservoir size.

AutoCAD

- Created site plan with layers to signify the pipe system and the break pressure tanks throughout the system.
- Created details to show specific elements of break pressure tanks and water storage.

Results

Design Flow & Pressure

- Pressure: 4.26 psi - 42.64 psi (3m to 30m of head) at all points within the system.
- Flow rate of 5 GPM (18.93 LPM) to fill a 265-gallon ($1m^3$) pila in less than 1 hour.

Pipe Material, Size, and Length

- PVC pipe selected for material.
- 8800+ meters of piping required.
- Used only two pipe sizes for cultural appropriateness.160 mm and 63 mm (6” and 2”) pipes were selected.

Pressure Zones & Break Pressure Tanks

- 18 break pressure tanks used to create 19 pressure zones.

Spring Protection Plan

- CODEINSE spring protection structure for water quality.
- Ensures safe water quality for years to come.

Water Storage Tank

- $90m^3$ ferrocement tank selected.

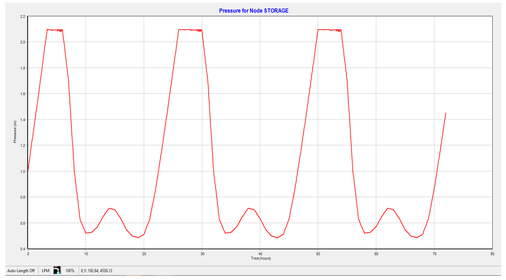


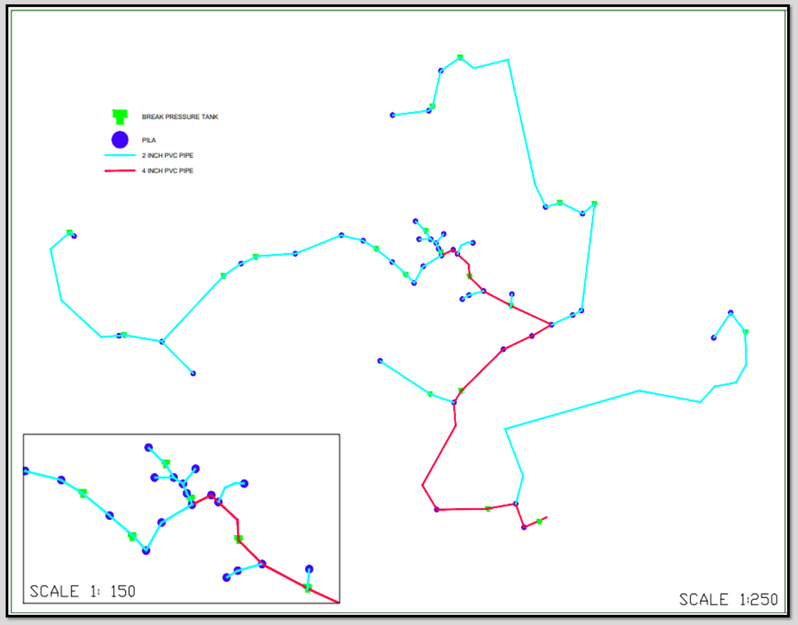
Figure 1: Storage tank volume over time

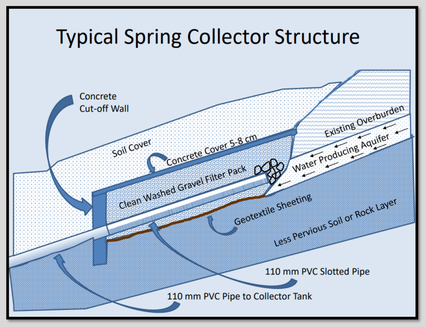
Chlorine Dosage

- 74 grams of chlorine shall be added per week.
- $250 of chlorine required per year.

Opinion of Probable Cost

- Capital Costs: $68,000.
- O&M Costs: $1,500 per year.
- Desired Budget: $75,000 based on GPD analysis of the region.





From Left to Right: David, Matt, Trevor, and Jose

Objectives

Water Distribution System

- Provide direct access of water to each specified location of the community.
- Produce a spring protection plan to keep the spring clean from contaminants.
- Calculate possible disinfection necessities using chlorine as the disinfectant.
- Design storage tank to meet the maximum daily demand for the system with a 25% contingency.
- Map system in EPANET to ensure system meets the flow and pressure ranges for the municipality.

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