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The ETHOS Center

Fire Suppression System

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with Zona Juvenil

Abstract

Although Guatemala is often pictured as lush rainforest, much of the country faces an annual dry spell of nearly six months. Such is the case on the Zona Juvenil Youth Ranch in Huehuetenango, Guatemala. These long periods of drought are typically accompanied by a constant risk of wild fires. In order to ensure the safety of the ranch and the boys it houses, the team was tasked with designing and installing a ranch-wide fire suppression system.

Figure 1: ***ETHOS team & Youth Ranch boys***

Introduction

While Guatemala's summers are full of months of rainfall, winters often see months pass without a drop of rain. During these long dry periods, well water is similarly scarce. Any house faces a serious threat of raging fire during these periods, but the Youth Ranch's wooden interior faces a greater threat than the average Guatemalan adobe house.

Project Description

In order to design the fire suppression system, the team first set to measuring out a likely route. After ensuring that the entire ranch and nearby guest house could be covered by three hose stations, the team began head loss calculations to ensure that the system could function without a pump. With a steep mountain slope rising behind the ranch, the team planned to take advantage of the topography rather than forcing the ranch into a costly pump purchase. Even in using worst-case pipe flow assumptions, gravity lead to sufficient exit velocity for all three of the hose stations.

Results & Discussion

Due to the nature of the project, a full testing of the system was not possible. Although the system was not tested at putting out a fire, the biggest concern in design had been the exit velocity of the water, so the team allowed each of the three hose stations to run for a minute each in order to ensure they would be able to provide sufficient water pressure if necessary. Even without proper testing, the project was a success for both parties. For the team, it offered an excellent opportunity to employ engineering knowledge in a real-world situation, where the final result was a legitimate visualization of the design. For the ranch, the project offers a guarantee of safety from an annual threat. While it will hopefully never come into question, the ranch now possess a means by which to defend itself if the annual dry spell's wild fires pose a serious threat. As extreme weather stands to become more frequent, such a prevention system is surely a good backup plan.

Figures 2 & 3: ***Three completed hose stations***

Recommendations

- Better ensure that pipes are sufficiently glued together before sending water through system
- Install a valve further down in the system in order to make minor adjustments without shutting off the entire system

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