Cruz Chich y Chumisa Water Distribution System, Guatemala
Project Abstract

Located in the highlands of Guatemala, the villages of Cruz Chich and Chumisa are rural, poor communities with an agricultural economy. The 3,700 inhabitants have lived without access to clean sources of water, especially in the dry season. Having to rely on untested streams, small springs, and inconsistent rainwater, the villages experience high rates of waterborne illness and increased infant mortality. In response, the village of Chumisa purchased a water spring in 2017 and, to develop it, collaborated with Cruz Chich in 2019, submitting a proposal to partner with Engineers Without Borders (EWB). After delays due to the coronavirus pandemic in 2020-21, EWB accepted the application in 2022 and matched the water treatment and distribution project with a university student chapter. The university students and EWB-Guatemala promptly began implementing the project to provide access to clean water for these communities.

With two project leads, the students recruited a team of professional mentors, university faculty, and multidisciplinary students — all crucial to the success of the project. Four teams — water resources, CAD, structural design, and construction — participated in weekly meetings to create and refine designs for the water system's spring box, tank, and distribution network. Along with skills gained through coursework and work experience, students regularly receive feedback from the Responsible Engineer in Charge and other licensed professional engineers having significant experience in international infrastructure projects. The mentors provided not only exceptional technical assistance through their experience with local regulations, engineering design, and sustainability but also tremendous leadership based on their knowledge of logistics, project management, and teamwork.

Throughout the project's timeline in 2024-25, students prioritized the health, safety, and welfare of the two communities. The young engineers assessed regional needs by considering existing infrastructure, material availability, construction familiarity, and financial constraints. Additionally, students planned for the project's long-term sustainability by appointing a local water committee, providing training in operational maintenance, and teaching proper hygiene and public health practices.

Students gained technical as well as non-technical skills throughout the project. The team developed engineering knowledge, including water sampling and conducting related analysis, designing a distribution map in EPANET, hydraulic modeling, performing tank structural analysis, 3D modeling in AutoCAD and Fusion360, scheduling, cost-estimating, and quantifying materials. Non-technical skills gained involved project management, international communication, stakeholder engagement, ethical decision-making, leadership, and sustainability.

The project overall enabled students to grow significantly as engineers who learned invaluable lessons that will shape their future careers and lives. Through collaboration with professional engineers, multidisciplinary involvement, and human-centered design, this experiential learning will not only help thousands of underprivileged individuals but also will motivate students to continue humanitarian efforts that make enduring, positive changes throughout the world and their own communities.