ENGINEERS WITHOUT BORDERS
UTAH STATE UNIVERSITY
4110 Old Main Hill
Logan, UT 84322-4110

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Friends of Engineers Without Borders Utah State University

Your support and financial assistance made it possible for a team of USU undergraduate students in Engineers Without Borders (EWB) to travel to Uganda, East Africa December 12 – 29 and install several water systems, seven solar panels for lighting and an educational system. The travel team was assisted by two engineers from the professional chapter of EWB in Salt Lake City which also provided financial support for the project.

The team worked at the Byana Mary Hill school/orphanage. It boards about 125 children and provides day school for about another 125 children who live in the surrounding area. The children range in age from three to sixteen. The school is run by a group of Catholic nuns who accept all children who have nowhere else to go. The classroom building is constructed from bricks manufactured from the clay on the site. The walls have large openings for windows, but there are no frames or glass in many of the openings. The USU team visited over the Christmas holidays when most of the children were with nearby relatives or with community members who take them into their homes; only a dozen or so of the children who had absolutely no one to visit remained at the school.

The school/orphanage is located in a remote area outside the small city of Masaka, and does not have electricity, telephone, TV reception, clean water, transportation, or adequate sanitary and bathing facilities. They have developed agriculture and the children and nuns work in the fields along with some local farm laborers to raise all of their own food. They also raise a few cattle and milk cows. Bananas, passion fruit, mangos, and other plants are integrated with the natural jungle foliage and provide a significant amount of food. During parts of the year harvested crops are stored in the back of the classroom building. During the day the front of the room is used for classes, and at night thin mattresses are spread on the floor to provide a sleeping area for the boys.

The school/orphanage is mostly self-sustaining. It is a hard life, but they are a wonderfully hopeful, friendly, and hard-working group of people.

The objectives of the trip were to:

- Install a 20 – 30 foot deep well into the perennial water table to provide a source of cleaner water. The previous source of water was an open pond adjoining a marsh.
- Install a submersible pump in the well powered by a small gas generator.
- Construct an 8 foot high concrete water tower supporting a 750 gallon water tank.
- Construct a 10 foot by 10 foot brick building to house the generator using bricks produced on site.
- Install a 260 foot PVC water line from the pump to the water tower.
- Install over 100 feet of gutters on the classroom building to collect rainfall runoff and direct it through a downspout into a second 750 gallon tank.
- Install solar panels, controller, battery, 12v lights, and 12v TV/DVD system for children's educational programming in the classroom building.

- Install solar panels, controller, battery, and 12v lights in the girls' sleeping quarters (two buildings without windows where triple-decker bunk beds are tightly packed together).

Members on the traveling team were:

Ashley Karras, senior majoring in Broadcast Journalism
David Sanders, senior majoring in Civil and Environmental Engineering
John Sapp, senior majoring in Civil and Environmental Engineering
Ryan Davies, senior majoring in Civil and Environmental Engineering
Bill Grenney, Professor, Civil and Environmental Engineering, faculty mentor
Jim Schubach, Engineer and member of the professional chapter: EWB-Great Salt Lake
Mike Newberry, Engineer and member of the professional chapter: EWB-Great Salt Lake

With the help of many hard-working local volunteers, the team accomplished all of the objectives with some innovative modifications necessitated by local conditions. Attached are some pictures to give you an overview of the trip. Ashley brought a professional video camera with her on the trip and is producing a documentary for distribution on DVD which should be available in the Spring.

More than 30 men and women from surrounding villages, many of them past students of the school, showed up at the site and volunteered to help. The team was greatly impressed by their strong work ethic and their construction skills using rudimentary tools. Many of the volunteers worked shoulder-to-shoulder with the team 10 to 12 hours per day for the entire two week period, often working into the night using lanterns for light. The team members came home with the understanding that these wonderful people are willing to work hard to improve their own life situation, and the help they need is for education, technical guidance, and the physical resources to get the job done. One of the lasting benefits of the trip will be the knowledge that the local volunteers gained, and that they can now use to implement other projects on their own.

Although much was accomplished, there is still much to do here and at other locations. We hope to be able to send another team before the year is out. Some of the needs for this school/orphanage are:

- Install a bypass on the rainwater catchment system so that the initial dirty water flow will bypass the tank.
- Install a solar pump in the well to save the cost of petrol when the sun shines.
- Add more solar panels to increase the capacity for lights in the remaining five large classrooms, and to extend the length of time that the educational equipment will run.
- Conduct a needs assessment for teaching materials and content for the TV/DVD educational system, and provide the materials.
- Provide improved sanitary and bathing facilities.

Now that EWB-USU has experience in the country, teams will be much better prepared to help other schools/orphanages with their water and light needs. So the chapter has many options, now it is just a question of priorities and finances.

Thanking you for your encouragement and support, we are

The Masaka Uganda EWB Travel Team

Ryan and the team arrive at the school/orphanage to a warm welcome. Notice the openings without windows in the classroom building

Traditional music was part of the welcoming ceremony

Children danced and put on a great show

Bill with Mr. Ssentamu, a local businessman and supporter of the school who provided transportation for the team

All of the food was obtained from their fields and surrounding jungle - organic farming at its finest. A wide variety of delicious foods were prepared for us every day

Food was cooked on wood stoves in the kitchen building without windows, lights, or ventilation

Digging the trench for the pipeline began on the second day

The 260 foot PVC pipeline connecting the well and the water tower was completed in two days

Children were curious about all of the construction activity

John supervising the start of the digging for the well

Concrete cylinders were purchased for constructing and lining the well

The well at four feet deep

Well cylinders were weighted with bricks overnight to make them settle faster

The well at 11 feet deep. The groundwater inflow was so great that construction had to be stopped at this depth for now

Gaps between cylinders were filled with quick-drying cement to prevent infiltration

Volunteers constructing the generator house

Ryan shows volunteers where to lay out the footings for the water tower

Concrete was mixed in a wheelbarrow or on the ground for the water tower footings and other construction

Reinforcing bar and some of the other materials were transported from Masaka to the school by motorcycle

Reinforcing bar was cut to size by hand at the school

Reinforcing bar was bent into shape by hand

Placing the reinforcing for the slab

Dave testing the float valve in the water tower tank. Forms will remain in place for 30 days to allow the concrete to develop full strength

The first running water at the school

John installs lumber structural supports for the gutters

Ashley helps with the gutter installation

Dave, John and volunteers set the tank on the completed foundation

Dave inspecting the final roof catchment system

The door on the right is the metalworking shop in Masaka. The next four doors to the left are a beauty salon, shoe repair, furniture making shop, and grocery store

Fabricating the frames for the solar panels at the metalworking shop

Bill and Violet (a Ugandan college student volunteer) installing the solar panels into the painted frames. This is in one of the school classrooms

Jim and Dave lifting one of the solar panel assemblies up to the roof

Bill and John on the roof making the final installation of one of the assemblies. Panels are installed horizontally at the equator

Ashley brought Christmas candies and magnetic letters and numbers for the children

Violet feeds wires from the solar panels through the roof and helps with the interior wiring. The volunteers learned important new skills during the project

John installs wiring for the interior lights

Peter (one of the teachers at the school) and Violet install lights in one of the classrooms

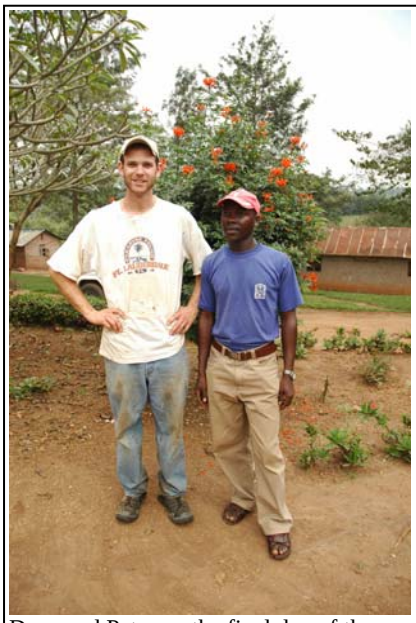
Bill gets a hug and letters of appreciation from Sister Rose, Head Mistress of the school/orphanage

Judy (our guide, center), Bill, Mike and Jim (left to right) with other volunteers tour the surrounding fields and jungle

Teachers and children viewing the new solar powered TV/DVD educational system

Mike with John, the leader of the volunteers

John Sapp and John celebrate the success of the project



Dave and Peter on the final day of the project