

Concrete & Building in Haiti Jubilee

Report Concerning the March 2016 Trip

As of May 16, 2016
By: Herb Nordmeyer

Introduction

The team consisted of Helen Roenfeldt, Executive Director of Mission:Haiti, Scott Conover, David Vangsness, and Herb Nordmeyer.

We collected in Ft. Lauderdale on the evening of March 10, 2016, and flew to Port-au-Prince on the morning of March 11 and returned to the US on March 26, 2016

Three reports are filed for this trip:

The first one concerns activities other than Jubilee and Faith Lutheran Orphanage (dated March 15, 2016).

This one concerns our work in Jubilee (dated March 16, 2016).

The third one concerns our work at Faith Lutheran Orphanage (dated March 17, 2016).

Jubilee – Erecting the Airform – March 17

GPS Location of Dome 2

N 19° 26.283 W 072° 41.430

This dome is to be the home of a blind lady and her family.

We knew that installing this dome would be a problem because the lot size was approximately 22 feet by 24 feet and the Airform was 20 feet in diameter.

During the time the Airform was being installed and plastered, Scott was sick for parts of two days. This created problems, because David did not have experience with this type of construction, and Herb's time was divided between several conflicting needs.



With appropriate equipment and with a trained crew, the Airform can be installed in 3 to 4 hours. We were starting at 7:30 am, so we could be finished with the installation before the sun turned the inside of the Airform into a Sauna.

The generators were not waiting for us at the church in Jubilee as promised, so we had only one battery-powered drill. It was being used to drill holes; then the bit was replaced with a socket, and it was used to set the Tapcon anchors.

Our trained crew was not. On the previous trip we had trained a crew, but over half of the crew had been replaced with untrained people. One reason given was that they needed jobs.

Without the generators, we could not use the electric drills, and we could not use the blower to provide ventilation under the Airform.

When the crew started attaching the Airform, they installed several clamp angles in a straight line. That got corrected. What was not noticed was they then installed the clamp angles against the hooks in the slab which were designed to attach the basalt reinforcing rope. These hooks are placed so they are about 2 inches away from the Airform. This placed the Airform off center of the slab and used a larger diameter, so the back side ended up straight and away from the hooks in the slab. It does not seem like much, but the Airform has a circumference of 754 inches. It was being installed as if the circumference was 766 inches.

We discovered that the crew did not know how to drill a hole with an electric drill. They ended up breaking bits and wallowing out holes. Lead anchors had to be used in several places. Scott held a training class to teach the crew how to use a drill. That helped.

By the time we got the generators and purchased replacement extension cords, the heat of the day had set in, and working under the Airform was extremely hot.

Since the Airform was too close to the hooks to attach the basalt rope as it passed back and forth over the dome, one meter lengths of basalt rope were cut and two pieces were threaded through each eyebolt on the slab. This is so we could attach the basalt rope that was going over the Airform.

The manometer was installed. Scott used an empty water bottle to transfer water from a bucket to the manometer. That night he had stomach problems and wondered if he inadvertently drank water from that bottle.

The 4" bypass valve was installed, but the float stuck, so it was replaced with the 2" bypass valve. It worked well.

As soon as the Airform was attached, caulk was used to seal the joint between the Airform and the concrete. By the time that was done, the air pressure was climbing.

The crew then added the Glad Wrap around the joint and placed sand on it. For whatever reason, they piled lots of sand on; and when Herb called a halt to sending sand in, he was told they needed 10 more buckets. He told them to spread out what they had and to send out all of the tools.

After several requests, they finally spread the sand around and sent a bucket of tools out and came out. They left the 2 x 4 props and the center pipe which had broken at the base in the dome.

By the time the crew came out, we were getting 5.5 to 6 inches of water pressure.

We needed a guard for the night. Since one person can get lonesome and might fall asleep, we were comfortable with having two night guards. The crew insisted that 5 people be on guard duty. This elevated the cost of the dome.

The mixer was delivered to the Guest House so the motor could be installed. Installing the motor was delayed because the pulley which was shipped with the motor was missing. It was finally found, but there was a problem installing the pulley because the mechanic threw the pulley box away without removing the key that was needed for installing the pulley.

While Herb oversaw the mixer repair, Scott was sick, and Dave built door and window bucks, installed hurricane braces, and cut and installed lengths of basalt rope mentioned in a previous paragraph.

The parts of the scaffold were located. They were stored at a house near the church. The crew went and retrieved them and carried them to the building site. We then assembled the two ladders and added 2 x 4s for bracing at the top.

After lunch we added the support arms to the ladders we had assembled before lunch and maneuvered the polar scaffold over the blind lady's house and over the dome. The job was made difficult because of all of the debris, rock, and fences in the way. When we got the polar scaffold in place, the bottom of the scaffold was touching the top of the Airform.

Sand was delivered. It was good river sand without clay. There were a few particles up to ½ inch in diameter. The crew was going to screen it on a 4 mesh screen, but Herb said no. So far, this is the best sand he has seen in Haiti.

An unanticipated expense surfaced when we were making arrangement for security and keeping the blower running over night. One person is needed, but since a night can be long and we cannot afford to have the one person on the job sleeping, we understood that we would have two people. Instead, the crew insisted that there be five people on site over night to keep the Airform inflated and to protect it.

Another unanticipated expense surfaced with we informed Pastor Benoit that we needed only 8 people for the crew and he furnished us 12 because they needed jobs. Most of them were not trained.

Applying the First Coat of Stucco – March 18

On Friday, March 18, we arrived at the building site and the mixer was there.

Our first order of business was to raise the scaffold so it cleared the top of the dome when a person was on the scaffold. We raised the scaffold legs to their maximum extension, and the scaffold still touched the top of the Airform. We sent Lophane to purchase concrete block. He purchased 12 because he had calculated that we needed 12. There were two feet on each ladder section and one foot on each of the two support arms. Since we



needed to raise the scaffold by about 16 inches, he figured the block would be placed two

high. It worked, but as we worked on the scaffold, the movement started breaking the block.

Since we were adding elevation and the block were not very stable, we had a person on each ladder and each bracing leg when anyone was working on the scaffold. Herb did go up on the scaffold, much to everyone's disgust. His only problem was his cane got caught on the rungs of the ladder on his way down. Finally he unhooked his cane from his belt and threw it down.

Scott had gotten sick overnight and came out to the site but shortly headed back to the Guest House and to bed.

Gabriel Vategy was selected to run the concrete mixer. The formula was to be four 5-gallon buckets of river sand, 1 bag of Portland, 1 ounce of Kelcrete Liquid, and ½ coke bottle of basalt fiber.

Gabriel was very conscientious in following the formula and in placing the items in the mixer in the correct order. After we showed him how the fiber bundles would break up, he was very conscientious about ensuring the fiber bundles were broken up.

While the word "macho" is not used in Haiti, the concept is alive and well. With the first batch, the smallest member of the crew was driving a wheelbarrow and insisted that it be filled. He nearly spilled the load. After that Herb insisted that each batch be divided equally between two wheelbarrows. With the rough terrain and debris, that was a full load for the wheelbarrows.

Each man with a trowel was given a stucco gauge which was set at ½ inch and told that the stucco had to be at least that thickness. It became a game to ensure that Herb could not bring his gauge and find a thin spot.

After the sides of the dome were plastered, the crew started working on the scaffold to plaster the top. They had to move the scaffold to get to most places on the top. That was not a pleasant chore since there was little working room around the base of the dome. Towards the end of the day, there was one place they could not get to, so Herb suggested they pitch small shovelfuls of stucco to the area and then spread it with the back of the shovel. Osmo grinned very wide and went to work. This was a new technique for him, and it solved a big problem.

Since the coats of stucco were thicker than one-half inch, we used more bags of Portland than Herb had calculated. His problem was exacerbated because the crew did not keep Herb informed as to the amount of Portland which was stored in the blind woman's home.

By the time the first coat was applied, it was full dark.

We used 17 bags of cement for the first coat rather than the estimated 10 bags.

Wrapping the Dome with Basalt Rope – March 19

We wrapped the dome with basalt rope. In the process too much rope was used in some areas and not enough in others. Since the Airform was not centered in the circle of eye hooks, we had two pieces of basalt rope threaded through each of the eye hooks that was too close to the Airform. This gave a method of attaching the basalt rope as it came over the dome.

The close confines made it very difficult to wrap the dome. Most of the rope was on

angles rather than the first layer directly over the top. We ended up using about 50% extra rope.

To inspect the placement of the rope, Herb climbed the scaffold to the chagrin of the crew. He found that there was very little rope close to the turbine base, so spent 15 minutes or so working on getting the Airform wrapped correctly.



Applying the Second Coat of Stucco – March 19

After the Airform was wrapped



to Herb's satisfaction, the crew was ready to mix stucco. Gabriel remembered the formula and the process. The men with trowels kept their stucco gauges handy and used them. The second coat went on very rough to give excellent bite for the third coat.

By the time the second coat was applied, it was dark. There was one small area on the top of the dome that did not get a second coat because the crew could not see to safely do the work.

Twenty-one bags of Portland

were used for the second coat.

Applying the Third Coat of Stucco – March 20

Scott was better. A determination was made that he passed a kidney stone overnight. We headed to church at Faith Lutheran, and since the time of the service had been changed, we arrived as the service was over, so we went to Jubilee and attended church.

After the service, we returned to the Guest House to change clothes and headed to Jubilee to apply the third coat of stucco to the dome. We arrived



at 11:45. The crew was waiting for us and by 12 noon we were mixing stucco.

When the plastering started, one of the men got on top of the dome to reach the spot which had not been plastered the day before.

When lunch arrived, we took a break and ate.

Then the crew started working around the doors and on the lower perimeter of the dome, and as the afternoon progressed, worked their way towards the top.

We had two extra men with trowels, so work went quicker. One of those men was the owner of the home behind the dome and whose fence we destroyed to get the scaffold in place. He did excellent work and worked rapidly.

Herb estimated that it would take 14 bags of Portland cement. It took 14 bags.

Removing the Airform – March 21

The team went to Jubilee and started working removing the scaffold and Airform. His companions determined that Herb should remain at the Guest House, so he concentrated on bringing his daily log up to date. The plan was that as soon as any of the crew members were free in Jubilee, they would proceed to the Orphanage and start to



clear the area for the dome. They felt that there was no need for Herb to wear himself out at Jubilee or during the land clearing.

Lophane returned to the Guest House with the Airform about 9:00 am and rolled it off the pickup in front of the Guest House. He picked up the breakfast the ladies had fixed, and he and Herb headed to Jubilee. After looking over the dome over, the crew ate breakfast. The dome was in excellent shape. The wind turbine had been mounted on top of it. Dave was working on rebuilding the fence that we had taken down as part of the construction.

Leaving Dave and a few crew members, the rest of the team headed to the Orphanage to start work installing the slab for the Girls' Dorm.

Progress on *Homes for Jubilee* Book

English Version

The English Version of *Homes for Jubilee* is nearing completion. Debbie Salinas with Shepherd of the Hills Lutheran School is developing the cover. The photo is her draft of the cover. It has gone out for comments, and we have received a number of comments.

Haitian Creole Version

We have a few captions and the information which needed to be translated in March. We got them translated, but cannot read the handwriting. As soon as that is accomplished, we will proceed with publishing.

Publication of the Two Versions

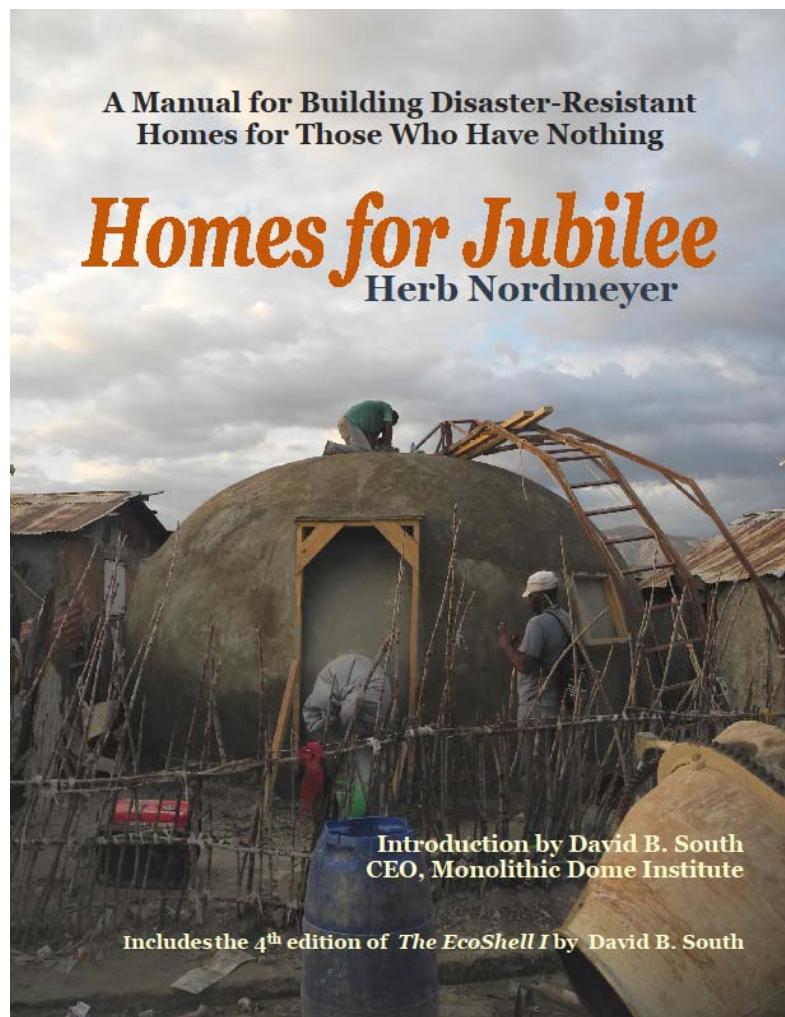
We will be doing the initial print run using Print on Demand technology.

Pastor Benoit will probably distribute many of the books, since he is constantly talking to groups who are interested in the technology.

Copies of the English Version will be furnished to those who donated a home for Jubilee and those who have made substantial time and technology contributions to the project. Copies will be furnished to SHLC to distribute for a suggested donation to the project. The amount of the suggested donation has not been determined. Additionally, a copy will be furnished when any new grant application is filed.

Domes of the World will promote it on their website.

The books are being formatted for 8.5 x 11 inches. In talking with the printer, when using Print on Demand method of printing, each copy will cost about \$4.00 plus shipping. If we see a demand for printing 2,000 copies at a time, we will switch to lithography, and the cost per copy will be substantially reduced. At the moment, we do not believe that storing 1,500 copies in someone's garage is a good use of our limited funds.



Spraying Stucco

I have two MortarSprayers. These are devices which are not unlike hopper guns on steroids. A MortarSprayer costs less than \$500 US each and is powered by a large portable air compressor (13.6 cfs at 100 psi). Such an excellent-quality, gasoline-powered air compressor costs about \$1,200 US. Using a MortarSprayer will increase the rate at which stucco can be applied to an Airform, will lock the fibers into the stucco to produce a stronger structure, and will allow the stucco to be applied in more even coats. Before we start working on the 30-foot dome for the Girls' Orphanage (September, 2016), an appropriate air compressor would be a good investment. If that happens, I will ship one of my MortarSprayers to Haiti. To ensure that the crate gets to Haiti in time, we would need to ship by not later than August 1.

With the building of the Boys' Dorm, we will have to be shipping more basalt to Haiti, so the compressor, a MortarSprayer, and the basalt could be combined into one crate.

Finding Funding

So far, funding has come in as we have needed it; however, we are proceeding at a slow rate. After the Haitian crew is fully trained, and if funds are available, they could be installing a 20-foot dome every two weeks. By splitting the crew into two crews and adding some apprentices, a dome could be completed every week. An Airform, if well cared for, will last for constructing 100 domes. As the rate of construction increases, we will need to add additional Airforms, so if one fails, we do not have a delay while it is replaced, and so a third and fourth crew can be trained and start building.

The original challenge had been to develop technology which would allow disaster-resistant homes to be built for a material cost of \$1,000 US. Initial work showed we could do it for about \$2,000 US. After we started building slabs, and we learned a little more about shipping costs and import duties, the cost went up to \$2,800 US.

Besides material costs, we have labor, transportation, etc. Since the crew does not eat on a regular basis, we furnish them two meals a day. Our current best estimate is that each 20-foot dome will cost about \$8,000 US. As the crew gets more skilled, and there is less need for supervision, the cost will drop slightly.

Fighting that reduction in cost is that inflation is starting to take place in Haiti.

If we are building 50 homes per year at a cost of \$8,000 US each, we will have a budget of \$400,000 US per year. Then there may be infrastructure costs such as roads, utilities, and drainage. That will require some serious fund-raising. By having domes in place, by having the book finished, both in English and in Creole, and by having accurate costs documented, securing those funds will not be easy, but it will be easier. By collecting data on what disaster-resistant homes built with other techniques cost, it should enhance our fundraising efforts.

Most very small non-disaster-resistant homes built in Haiti cost in the neighborhood of \$5,000 to \$8,000 US.