Building a WFO (wood fired oven)

by **jon ball** on May 24, 2011

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Intro: Building a WFO (wood fired oven)

In the spirit of off the gridness and in an effort to be more self-sufficient, my wife and I recently tackled a new project at home. We built a wood-fired oven, or WFO, if you prefer.

An outdoor wood-fired oven gives us another option for many kinds of cooking. It also provides a great accompaniment to the barbecue. The WFO is a lot of fun to built and use. It provides a lot of feel good factor for having done it ourselves with little money. Of course, it also makes great tasting food.

We over-researched the subject by reading several books and by searching online before finally building it. We need not have prepped so much. Two of the most helpful resources were http://www.traditionaloven.com and the book “Build Your Own Earth Oven, 3rd Edition: A Low-Cost Wood-Fired Mud Oven; Simple Sourdough Bread; Perfect Loaves” by Kiko Denzer.

Materials list and cost:

I used:

less than 1.5 yards of 5/8 minus for the entire project – about $40.

"Urbanite" and large rocks - free.

Concrete block – free from freecycle.

Sand – free from river.

Coarse Sawdust – free from a local lumber mill.

Perlite – about $30 from the hardware store.

Clay – $150. (It could have been free with more elbow grease)

Material for the door – free from around the property.

Total cost: under $200.

Step 1: Pick your type of WFO

Type: We discovered that there are several types of WFO’s. Which is best depends on who is writing the article. Our primary concerns were the difficulty of the project, the cost of the project, and the look of the project. A $15,000 brick and marble WFO would look silly sitting next to our farmhouse, would be way beyond our budget, and might be beyond our construction ability. We decided on an adobe, cob, or clay oven. They exact material seems to be interchangeable. Since we are part-time potters, we happened to have a sixty-gallon garbage can full of left over clay from the past couple of years. We decided to use what we had

Step 2: Location, Location

Location: One of the most important and also most difficult parts of this project was picking a location. The WFO requires a location that places its back to the wind. Ideally, it should be out of the elements. It also needs to be accessible enough to be useable. We finally decided to locate our WFO off the end of our screened front porch, facing away from the wind. This would require rebuilding that end of the porch to allow for a screen door, building a shed roof for protection from our very frequent rain, and leveling the ground in that area.

Step 3: Size matters:

Size: We wanted something big enough to bake a small pizza, a small roast, or turkey, or a couple of loaves of bread at the same time. We wanted it a bit on the small side so that it would use less firewood and so that it would blend in. We settled on an inside diameter of 22 inches wide by 16 inches high.

Step 4: Getting to work: The Foundation

The Foundation: I started the project by locating the oven far enough away from the porch for safety yet close enough for convenience. I dug a square hole 54” wide and about 6” below the frost line and leveled the hole. Into this square hole I packed level about 4” of 5/8” minus gravel.

Image Notes
1. Foundation Hole 6" below frost line.

Step 5: Building up the base:

Upon this foundation I laid a square of the 8”x8”x16” concrete building blocks, three blocks to a side.

Image Notes
1. Concrete block stagger stacked on top of a packed base of 5/8" minus gravel.

Step 6: Completing the Foundation:

I stagger stacked five more layers of building block. After each layer of block, I filled the square with “urbanite” and large rock, filled all of the spaces and covered the rubble with 5/8” minus, and compacted it all with a length of 4”x4”. I did not fill the last layer of block so that the insulation layer would be deep enough. I capped the last layer of cmu with the 4”X8”x16” concrete cap.

Step 7: Adding the insulation layer:

The resulting 12” void was filled in with an insulation mixture made of sawdust, perlite, and clay slip. Equal quantities of sawdust and perlite were carefully measured by the shovel-full into a wheelbarrow. Clay slip, clay mixed with water into a sour cream consistency, was added until all of the particles were coated with clay. A rough ball made of the insulation mix did not splatter or break apart when dropped from waist height. This insulation layer was packed and leveled.

Step 8: Fire brick layer - the oven floor:

The Oven Floor: We purchased 16 medium-density firebricks from the fireplace shop and set them into the insulation layer. More of the insulation material was used to level the floor of the oven prior to building the oven itself.

Step 9: Building the Oven:

The Oven: I used a string with a pencil to draw a 23" diameter circle on the firebricks. Sand from the nearby river was screened and used to make a sand dome. We dumped wet sand in a pile on the bricks and painstakingly molded a dome. It was not as easy as it should have been. This was the most frustrating part of the project! Finally, after starting over a few times, we achieved a nice-ish, 16" high, rounded dome. Several layers of wet newspaper were plastered over the sand so that the clay layer would not stick to the sand.

(sorry, no pics of this annoying step)

Step 10: Building the oven - the 1st layer:

Our soil is very heavy with thick red clay. Either it is too wet to work, or is so hard that you need a pick to get it out. We had originally thought to dig our own clay, mix it with sand and straw, and to use this material for the oven. However, we decided to cheat a bit bought some very rough clay intended for large structural structures from the pottery supply warehouse.

We packed this clay 4" deep around the sand dome. Layer by layer we pressed the clay into itself around and over the dome, being careful not to press into the sand dome.

My wife then used a 2"x4" to not-too-gently smack the clay dome into a proper shape. The smacking helps consolidate the clay into one cohesive shell. Just do not smack it too hard or you will end up with a bulge on the opposite side or around the base. An arched door was drawn onto the front of the inner clay shell. It was about 66%, or 10.5", high by 12" wide.

Step 11: Building the oven - the insulation layer:

Over the inner clay dome, we laid up a 4” layer of the same insulation material used for the floor. The insulation layer stopped about 4” short of where the doorway was going to be cut.

Being impatient, we cut doorway into the dome. The doorway was cut with a bevel to keep the door from falling in.

Step 12:

The 3rd and final layer of the oven was a 2” layer of clay. This exterior shell was layer up in the same fashion as the other two layers with great care not to push the clay into the insulation layer.

The exterior clay shell was wrapped over the exposed insulation layer around the door. This created a continuous clay shell with a 2” reveal around the doorway.

After some drying time the oven was now firm enough to remove the sand. Using a garden trowel my wife carefully dug out the sand. When she hit newspaper, she knew that she had reached the inside of the dome. After the sand was removed, the newspaper was carefully peeled off the inner clay dome. A smooth piece of rounded wood used for shaping bowls on the potter’s wheel was used to smooth out the rough spots on the inner dome.

Step 13: Finishing the oven:

The exterior shell was paddled and shaped into a smooth cover. The final layer had to dry a bit before it could be smoothed completely.

My wife threw an onion shaped finial for decoration on the top of the oven. She then carved various designs into the dome.

A door made from 2x6's was cut to shape. 1x6's were cut to go over the face of the door and to extend 1" beyond the door in order to act as a flange to keep the door from falling in. An extra chunk of tile-backer was cut to shape and screwed onto the inside surface of the door for a heat shield. A pair of handles left over from a previous project completed the door.

Step 14:

Getting it to work: A small fire was lit inside the oven to slowly dry it out from within. The sun worked to dry it from without.

Step 15: Time for Dinner!

After it was dry (enough), we brought it up to white hot, pulled the coals out, put the door in place, and soaked it for about 15 minutes. While it was very hot, we cooked up a few small pizzas. It actually worked!

Since then we have baked bread, pizzas, backed beans, veggies, and bagels in it. We have learned when to pull the coals so that the food does not taste too smokey. The oven is a big hit. Many of those who have seen it want to build their own.

The WFO's potential and use are obvious. We have never used "firewood" in this oven. We have always used sticks, branches, and other left over non-treated wood products for firing the WFO. Usually about ½ of a five-gallon bucket is all that is needed per firing.

Image Notes
1. Fresh roasted serrano peppers - yum!

Related Instructables

we wanted pizza so we built a wood fired oven by drewgrey

Make A Height Measuring Tool. (video) by signalred

How To Build A Pit Oven (And Cook A Salmon In It) by Mr. Nova

Make pizza with a plasma cutter, a backhoe and a pile of mud! by fritz.bogott

How To Make A Cocktail Stirrer Snail (video) by paperpope

How to Build a Temporary Wood-fired Brick Pizza Oven with Cheap, Easy to Find Materials by mikejs

Comments

10 comments **Add Comment**

gfc62 says: May 26, 2011. 8:06 AM **REPLY**
Did you lay the blocks set in mortar or did you just dry lay them without any mortar or other adhesive?

rbbiggs says: May 26, 2011. 7:50 AM **REPLY**
Nice job, thanks for sharing it with us

mleonard says: May 26, 2011. 7:36 AM **REPLY**
Quite well done! For all of us that don't know much about potting and clay can you add some info about where to get proper clay and any hints about proper use for a oven?

Thanks!

tim_n says: May 26, 2011. 6:28 AM **REPLY**
hehe frustratingly I've been working on my own instructable for a wood fired oven! Was going to publish after this weekend when we'd done a few pizzas assuming it works!

Well done! Yours looks much nicer than mine - which has biiiig cracks in it :)

lazemaple says: May 26, 2011. 7:22 AM **REPLY**
post yours anyway! We learn different techniques and work arounds from each other!

germeten says: May 26, 2011. 7:19 AM **REPLY**

Artfully done, but couldn't the lower foundation have been used as the firebox, with the upper portion for cooking, baking etc.? It seems like a lot of work and a burly foundation, just to have a relatively smaller cooking area from which you need to add and remove coals

brazell says: May 26, 2011. 6:52 AM **REPLY**

Great job!!!! It looks beautiful! Can you take a pic of the door?

CrystalDesigner says: May 26, 2011. 5:00 AM **REPLY**

Beautiful! Thanks for sharing!

EmmettO says: May 26, 2011. 3:05 AM **REPLY**

Extremely attractive oven, well done!

What kind of clay did you end up going with? Is there a name for it's type (other than pottery clay)? I've never gotten good results from the clay around my region.

rimar2000 says: May 25, 2011. 9:44 AM **REPLY**

Congratulations, you have done a great job!