How (Not) to Build a Vortex Tunnel

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Materials:

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50+ 2x4's
10+ 2x8's
15 Sheets of 1/2" OSD/Plywood
Pipe Fittings
Pipe
Blacklights
Large Tarp
1/3 (or better) Horse 1725 RPM Continous use motor
Sparypaint
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Travel with us on our photo journey of building a Vortex Tunnel.

How to build a Vortex (Spinning) Tunnel

A Vortex Tunnel is rapidly becoming a staple for haunted attractions. As a result, we decided to build one for the 2002 season at Frightmare Forest. This is a photographic journal of what we did to build our Vortex Tunnel, the mistakes we made, how we corrected them, and hopefully it will give you a good idea of what is needed to build one of these things.

This is not an easy project. It will take at least two people during the ring building phase, and at least four or six people when you set this monster up.

Expect an update shortly explaining what we did over the 2004-2005

This photo shows our first idea for supporting the bridge. We figured that by creating our own I-beams, we could support the bridge across a 24 foot span. We were wrong. Our major problems occurred at where the two pieces of the bridge met in the middle. There just had to be a better way!

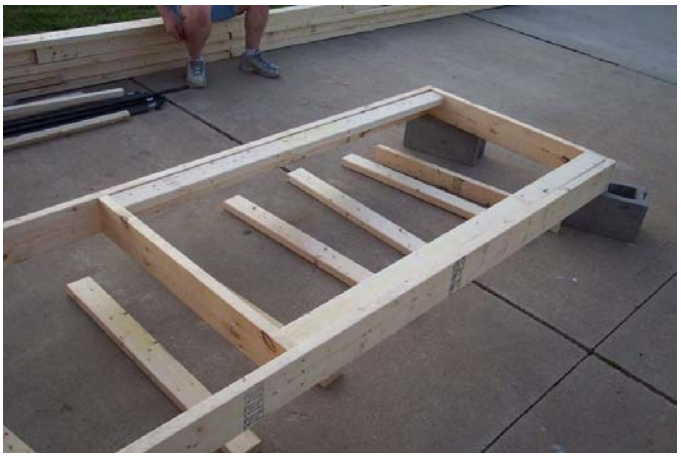
More shots of the I-beams. These work great if you have them on their sides where the 2x8's run vertically. There is a lot of flex the other direction (as pictured).

Scratch that idea, take these apart!

My dog, Boots, looks on in amazement.

The second idea for our bridge held a lot more weight. This is a photo of one of the 12 foot sections. 2x8's make up the box, with another one down the middle for support.

We will take the 2x4's and mount them flush with the top of the bridge. They are mounted every 16" on center.



Also, we take two additional 2x4's and run the flat on the underside of the bridge, which will give us something to mount our handrail to.

Here is a photo of the first section with the 2x4's in place. Remember that this is upside down.

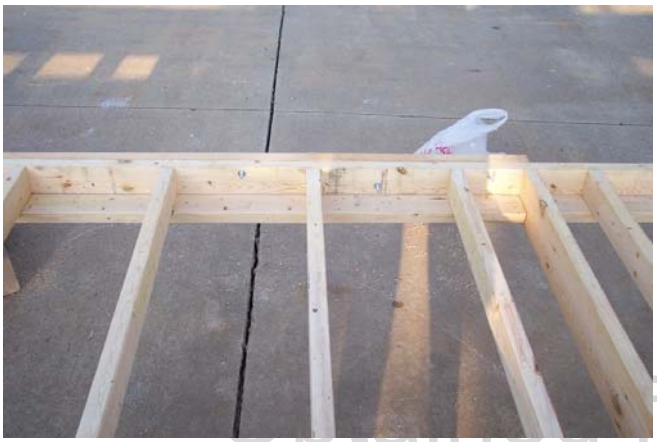
Sam puts on the finishing touches, and we flip it over. We build a total of two of these.

Here is a photo of the side of the bridge. This is both the 12' sections, bolted together in the middle.

Remember, we need to be able to move this thing 30 miles to the Forest.

Looks good! What a nice day it was.

Here is a photo of the connection in the middle. You should notice that we bolted another 2x8" x 12' onto each side of the bridge, centering the plank with the break of the other two sections. This provided quite a bit of support.



And here you can see the 2x4's that run under the bridge, which gives us something to mount piping to for the handrails.

Another shot, I'm standing on one end.

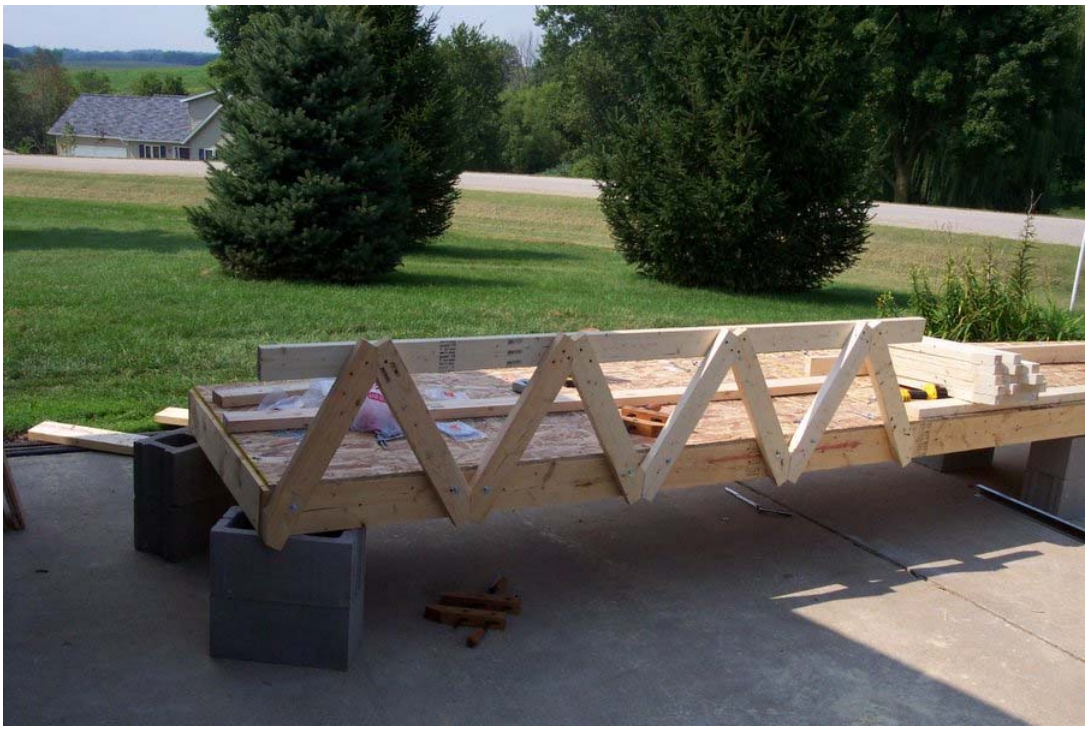
Here it is with the top of the bridge in place. It's made out of 1/2" OSD, but in retrospect, we should have used some metal grating or something. The final effect was still effective, so it worked!

The entire driveway slants downhill.

Another photo of the bridge.

Walking across it was possible, and it held several hundred pounds, but it would sag. I figured we would have 5 - 10 people on it at once, so it needed to be stronger.

Enter the removable trussing. All of this is built with 2x4's and bolted to the bridge. Each side is made up of 3 8' sections of trussing.



These angles were difficult to figure out. I had to revisit a lot of math that I don't use very often!

They just bolt on!

We raised the middle section a little bit while installing the trussing, to give it a bit of a natural arch.

Matt couldn't wait to get messy, so he starting painting while Sam and I worked on the trussing.

Amanda was present at the painting, here you see that we have finished one side.

Cindy also joined us painting, and both sides of the bridge are now trussed.

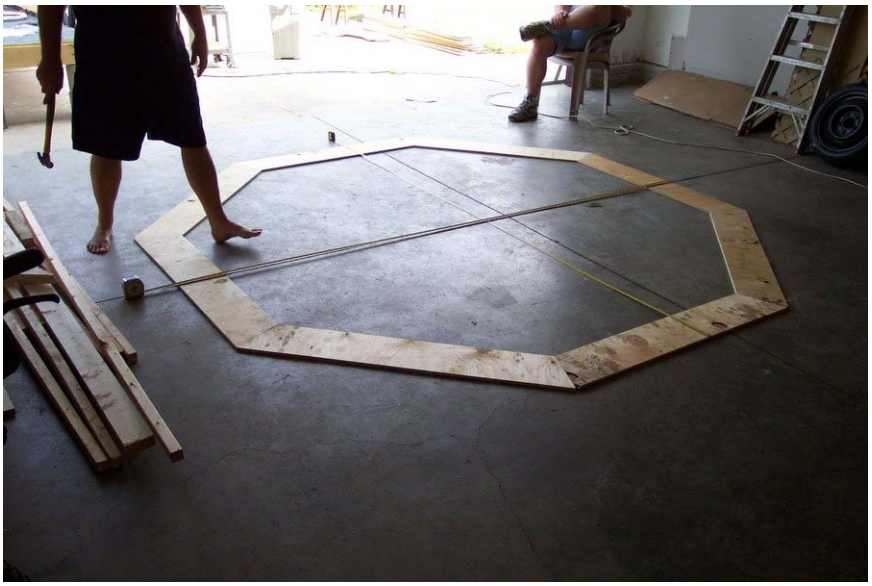
Here is the bridge, mostly painted.

Now, here comes the hard part. This is a bad photo of the piece of our jig that held our router.

And here is a side shot of the same.

We plan on attaching it to the 2x4 you see on the table.

Now that we had most of the pieces of the puzzle put together for actually cutting the arcs, we needed to get the wood cut. Wil was kind enough to provide some ideas, part of which we used. He recommended cutting the plywood into 8 foot wide strips, and then cutting each end of the plywood at a 22.5 degree angle. It would take 16 pieces to do a single ring that would be an inch thick.

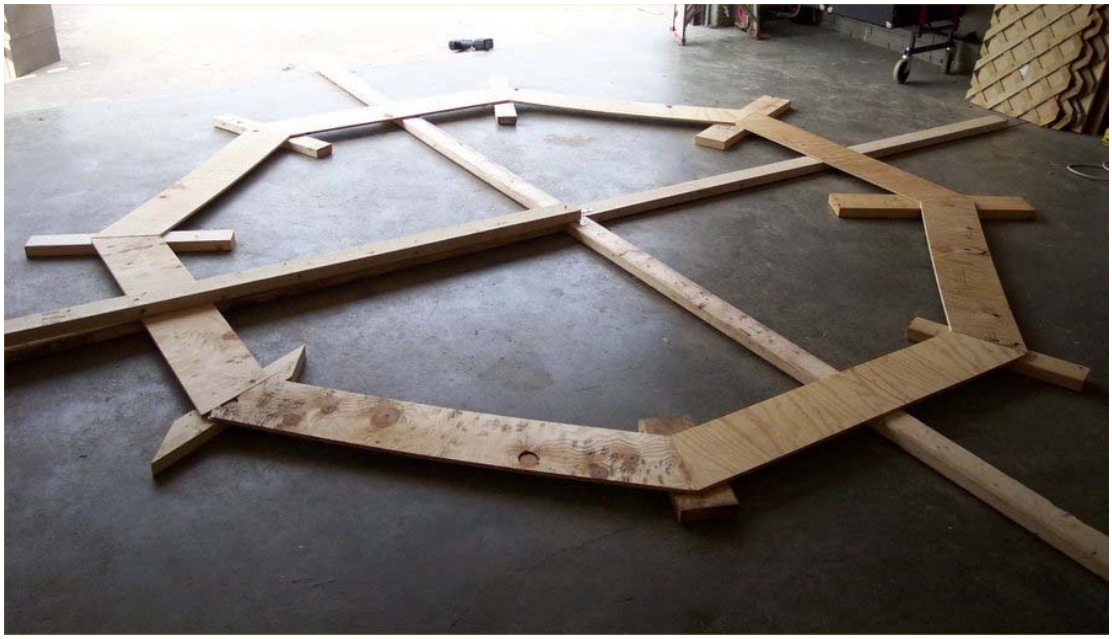


Here is the first layer, laid out on the garage floor.

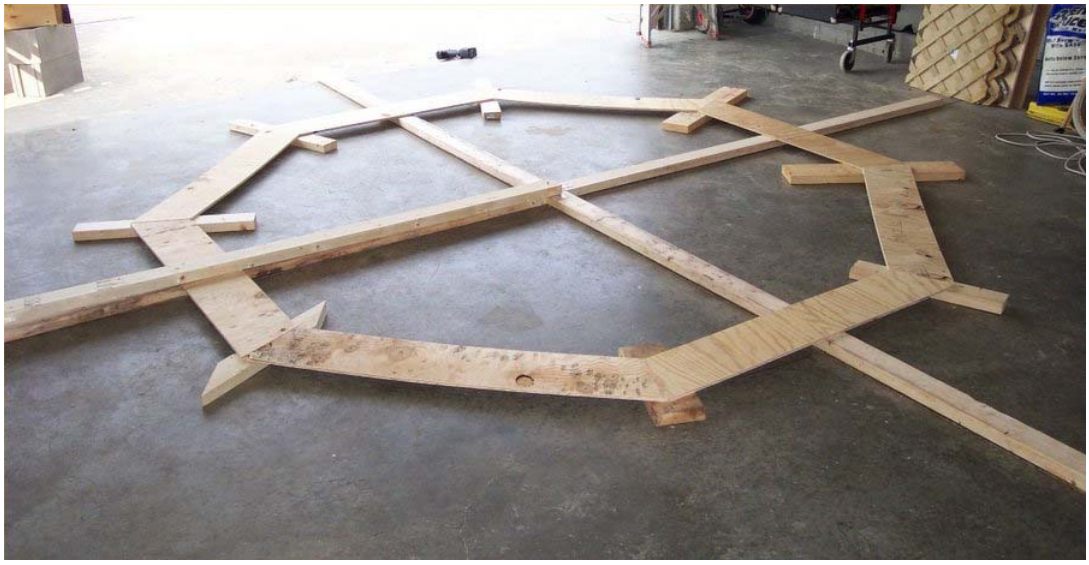
Using tape measures, we adjusted it until it was 'round'. My father, Rick, helped extensively during this part, as he has had experience making round observatories.

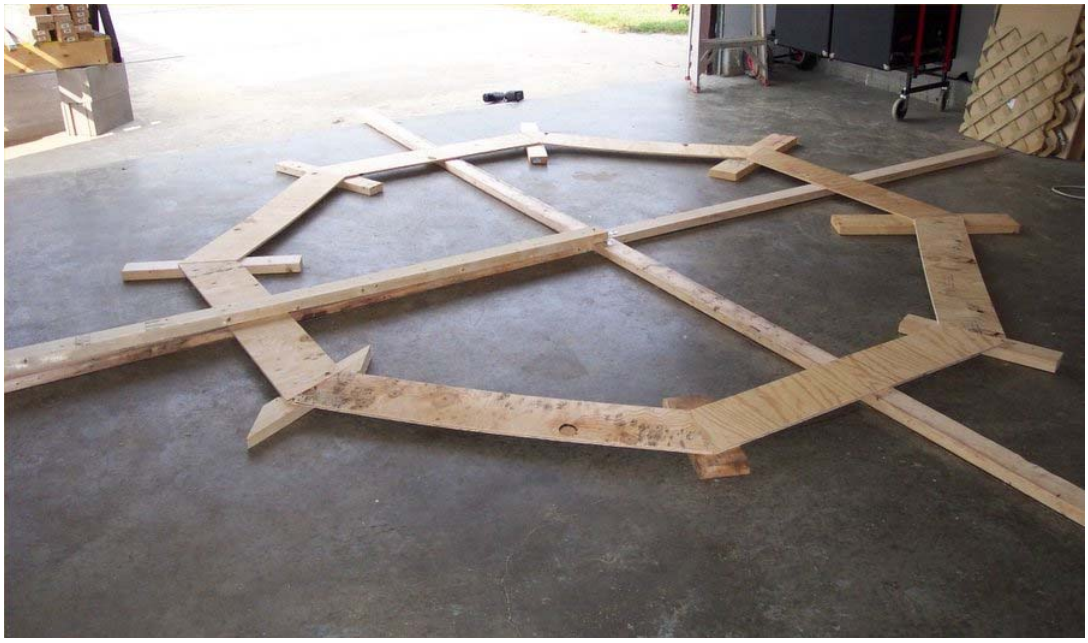
I'm not sure why this picture is here, but it's nice. Someone likes Pepsi!

Here is a shot of one of the joints.

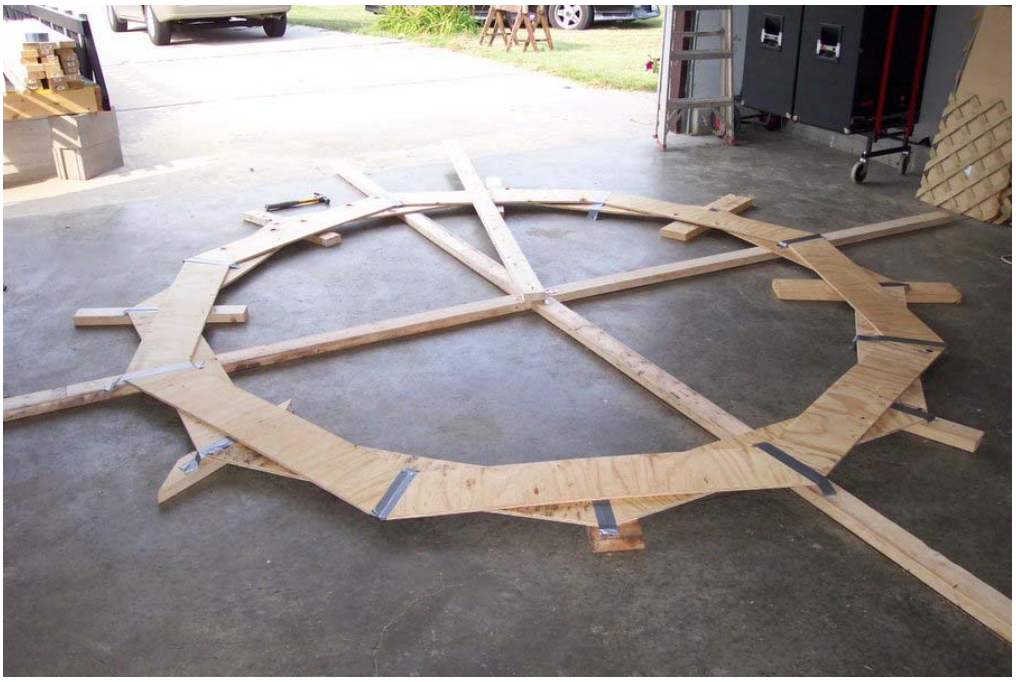


We tried building a big floor jig, that would simply allow us to take the router around the inside and outside edge of the ring, cutting the circle. This didn't work too well, but I will explain more later.





You can see the first layer on supports, and an arm that the router will mount to.



Here, we have arranged the second layer on top of the first. This needs to be offset, to the break of two borads on one layer will be the middle of a board on the other layer.

Duct tape held everything together, along with a few logically placed screws that were not in the way of the router.

Here it is, ready for cutting.

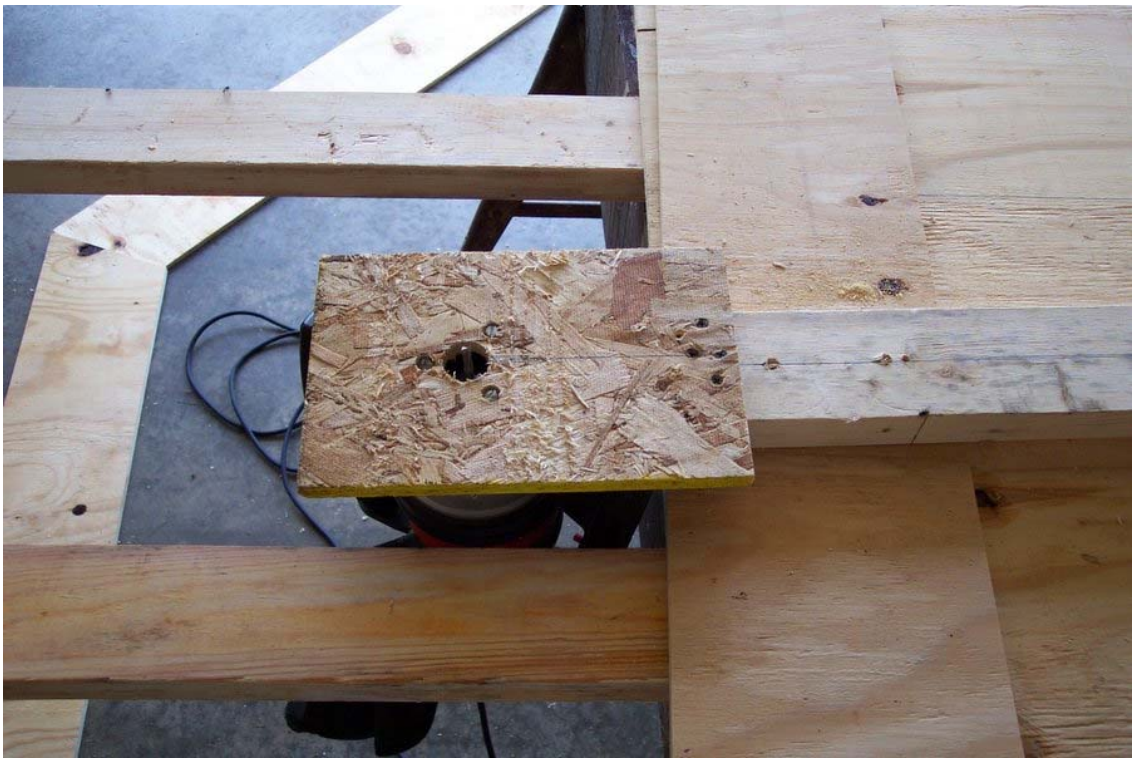
But first, we drew lines with the 2x4 arm. We needed about 3" wide rings.

Sam puts in a few last screws to hold everything in place.

And we make the first outside pass.

Here is a shot during cutting. This method would have worked great if the router bit was 1/2" longer! It was just short, and wouldn't cut both layers at once. We made the mistake of trying to flip the ring over, which didn't work. We ended up with a ring that had two cuts that did not line up.

So, we change our approach. Rick helped us design a jig that we could use to cut the other pieces of plywood that already had the 22.5 degree angles cut in them. Basically we cut each piece individually, and assembled them later.



Making the pivot hole tight and straight was very important. We didn't want to develop any stray during the process of cutting everything.

This is the pivot end. We had to raise it up a little bit to keep the arm at the same level as what it was cutting on the other end.

And here is the end that held the piece we were cutting. We used some scrap from cutting the angles to

make a holder for each board that we could quickly place in the jig.

A screwdriver is our pivot.

Here is a shot of the finished jig!

A board is mounted on the jig with two screws, and sometimes one in the middle. This prevents the board from moving around while we cut it.

Our router assembly, and the first cut is made!

Make sure to stop just after cutting the board, you want to minimize the amount of damage you do to the jig.

Here is the pile of boards before cutting...

And here they are after. Nice!

We lay out a ring on the driveway and have Aaron, who is a little over 6 feet tall lay in it to try it out. Looks plenty big enough to me!

These rings are just shy of 10 feet in diameter.

The process of assembling these rings is pretty easy. If you don't have to make these movable, you can just make each ring into two haves, and assemble the halves around the bridge. We needed to move these rings quite a distance in small vehicles, so these come apart into 4 sections.

The boards simply line up. Use a tape measure to make things round.

When assembling the rings, decide where you want your break points to be, and don't glue them! Everywhere else deserves a little wood glue, as well as some short screws.

A few of the rings stacked together. Once the first one is done, the rest are easy.

Here are all 3. At this point, we have bolted them together where they need to be, and we are ready to put them on the base.

Our first ring. Cory and Sam hold it up.

The base is made out of 3 of these things, one for each ring. Some 2x4's and bicycle rings are all that are needed.

All three of the bases.

We connected two of the rings together with 1/2" pipe and pipe mounts.

It's just about as tall as the garage!

The rings would sway back and forth a little bit, partly due to the slant of the driveway, but they did have considerable side to side play.

So, to make that more sturdy, we took some 1/8" hard board mounted to each ring

More shots of the hard board.

Some overnight advertising ;-)

Here we are, out at the forest getting stuff setup. The bridge is intact, and we have a large crew of people holding things in place while others work on the assembly.

It's pretty much put together for tonight, and it stands by itself.

Here is a shot of about half the people that were present that night to help put it together. Clockwise, starting from the left are: Mark, Josh, Danuuc, Matt, Cindy, Jason, and Nikki.

Now that the tunnel is assembled, we needed a way to cover it. Rain water collecting on the tunnel itself could lead to major problems, so if you have this outside, you really need a cover. This is a 1 car portable carport that we picked up from Menards for a hundred bucks. It wasn't quite tall enough, so we buried some 8' posts, and mounted the garage to that. Large pieces of blue tarp make up and front and sides of the tunnel.

We cut the doorway in the front for people to enter, and you can roll the door down when it's not in use.

A view down one side of the tunnel. You can see how the rings sit on the bicycle rims.

A view down the other side. The hardboard really holds the thing together well.

And here is the last photo I have of the construction process. The ramps were built on both sides, and a handrail was installed.

A few notes about handrails. People lean on these things HARD. We started off with some piping as handrails, and they were quickly bent and destroyed. We replaced the pipe handrails with 4' tall handrails that were built onto our trusses with 2x4's and it held up much better, without ruining the effect.

As far as blacklights go, we started with two 4' fluorescent fixtures. These worked remarkably well, and when we repaired the handrail, we added two more 4' blacklights. We also had two 18" blacklights mounted to the side of the handrails opposite the side people lean on. This lit up the neon spray paint dots we did on the bridge.

To drive the tunnel, we used a single 1/3 horsepower motor driving the center ring on the right hand side. We obtained the motor from a farm supply store, and it is a continuous use, 1725 RPM motor. We used a series of two pulleys and belts to knock the rotation of the tunnel down to about 8 RPM.

To cover the inside of the tunnel, we took a 20'x30' tarp that was green on one side and brown on the other. The tarp was stapled to the inside of the rings, brown side in. Then neon spray paint was used to apply the dots.

Here is a photo of the effect in action. It was a complete success! We have some new ideas for a better design for next year, and we will make them available as soon as possible.

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If you have any questions about building a Vortex tunnel, or if you are interested in a complete set of designs or a jig to help you cut our your rings, please contact us.