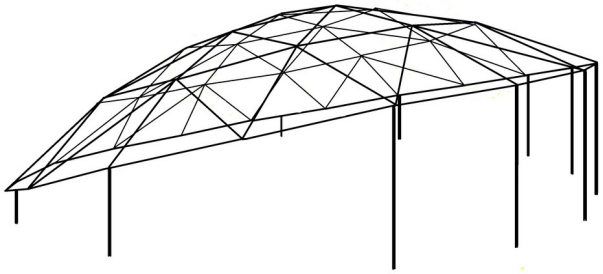
Wire shelter frame

This was an effort to develop a stable shelter for the lowest possible cost. Properly covered, this wire framework provides 44 square feet of protected living space.

A height of 6-1/2' and a diameter 7-1/2' makes it an adequate sleeping space for most of us. The fact that the frame can be built for less than $50 and only weighs 24 pounds makes it even more comfortable.

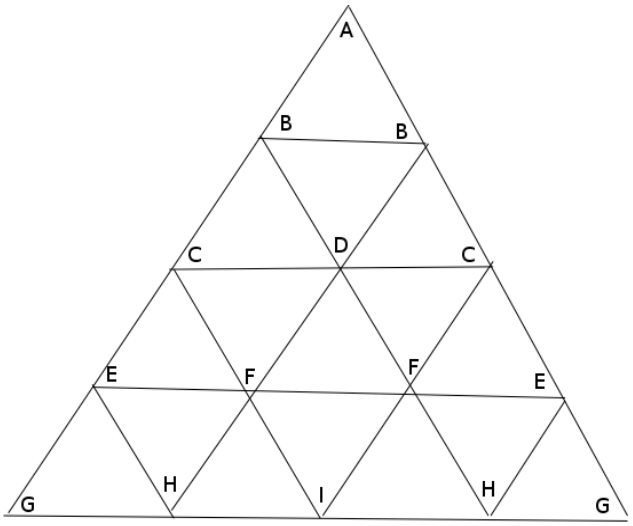
The top is a dome fabricated from pieces of #9 gauge steel wire welded together. This wire is commonly used to help stiffen the bottoms of chain link fences and is widely available at home improvements stores. The wall is 25' of 5'-high wire fencing.

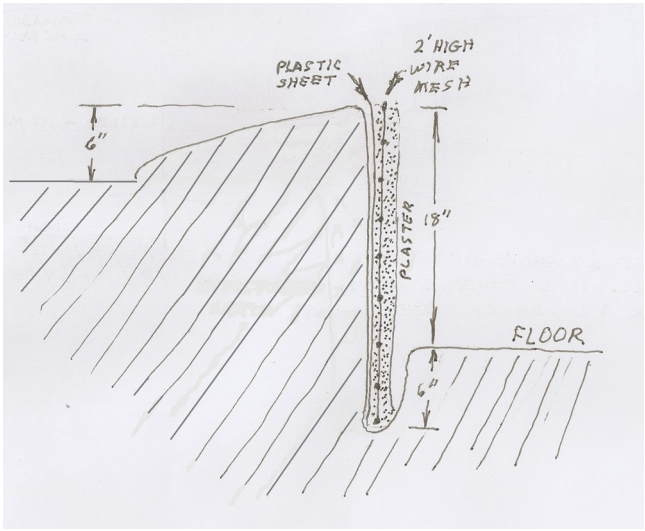


Local conditions permitting, a portion of the structure could be dug into the earth to provide a more snug and temperature-stable environment.

In this case the retaining wall for the bottom section is protected from the earth by a layer of plastic, and is plastered on the inside by a layer of premixed “topping cement,” applied to a couple layers of a wire mesh. This provides a rigid wall to retain the earth.

The floor should be raised a couple inches above the bottom of the retaining wall to minimize moisture. It could then be covered with a layer of plastic, and perhaps a rug, or section of used carpet.

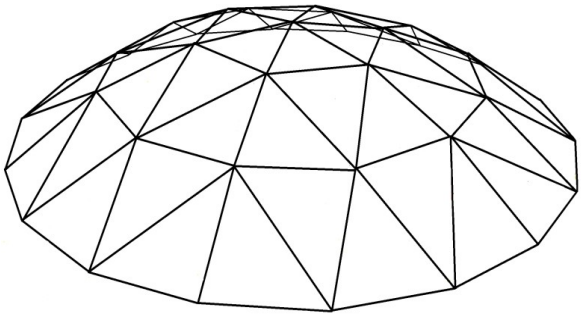


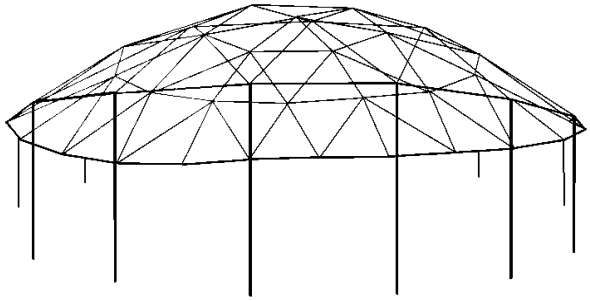


The dome is a low-profile parabolic structure with the radius equal to twice it's height (when there are four rows of triangles surrounding the center). The size used here is calculated for a ten foot diameter dome, but since we are only using three rows of triangles, the diameter for this project is only seven and one half feet.

The struts in the table below are identified in the left column by the letters on their ends in illustration to the left. Multiply the numbers in the "Chord Factor" column by the desired radius, to determine the length of each strut.

Note that the illustrations below shows only the innermost three courses, but the layout and table contain data for four. The illustration on the right shows the dome propped up at an angle.





Precision is essential here, because as you can see from this table there is less than one percent difference in length between the first two struts. Don't let this precision scare you, because I have already proven these calculations with two actual structures.

In "Your column" you may name your own radius and calculate that value times the chord factors. In this case, since I am using the inner 3 rows of a 10' diameter dome – hence the 7-1/2' diameter, the calculations would be based upon a 5' radius. On the other hand, if you want to make this thing ten feet across by adding another course of triangles, go for it; the calculations and strut layout are all included here.

Strut Name	Chord Factor	Length for 12'radius	Your column	Strut Name	Chord Factor	Length for 12'radius	Your column
AB	0.2519	3.0233		EF	0.2605	3.1257	
BB	0.2500	3.0000		EG	0.3322	3.9863	
BC	0.2670	3.2		EH	0.4018	4.8219	
BD	0.3237	3.8844		FF	0.2605	3.1257	
CD	0.2588	3.1058		FH	0.3407	4.0881	
CE	0.2948	3.5377		FI	0.3649	4.3786	
CF	0.3635	4.3622		GH	0.2611	3.1326	
DF	0.3135	3.5377		HI	0.2611	3.1326	

In dealing with the #9 steel wire, I chose to straighten and work-harden the wire by stretching it a little, before making the very precision cuts to the actual lengths. Since this can be tricky and dangerous, I don't want the responsibility of telling you how I did this.

The wires were held in place by delicately fusing their ends together with an oxyacetylene torch. I have done this with a standard 00 tip, but I found it much easier when I purchased a small art torch. Once the wires were in place, I strengthened the connections by fusing additional small amounts of soft iron tie-wire.

For the covering, I used a landscape fabric that is normally used to block the growth of weeds in gardens. This, I painted with a ten-year-life elastomeric latex roof coating. I attached slightly overlapping pieces to the framework by gluing them with blotches of the paint, but I might try small pieces of double-sticky tape next time.

This paint is extremely viscous – so much so that it did a poor job of wicking into and sealing the matting. I recommend at least two coats – both of them diluted way down to insure a thorough saturation of the matting. A third and slightly more viscous coat might be a good idea for the top. In any case, check for pinholes by viewing things from the inside against good lighting. I depended upon the penetrating paint itself to secure the matting to the framework, and it seemed to work OK.

I left a little bit of this roofing material protruding from the edge of the frame, to shed runoff.

After the final coat on the top, I wired it to the fence material and wrapped the side with the weed block matting. I found clothes pins helpful in securing this matting to the sides. I also applied small dollops of undiluted paint to the wire and matting from inside, to better secure the material.

A couple of layers of paint on the outside completed the roughing in of the basic structure.