

01360 – 30 foot low profile dome

Build this 700 square foot bolt-together shelter frame for less than \$1,000 (in 2021 retail materials costs). Then cover it with a material that would last a dozen or more years for less than \$250.

Being less than 800 square feet, this structure would qualify as a tent, and not subject to building codes. As a “temporary structure,” it should not affect property taxes.

This dome is only 7-1/2 feet high, and could either be tilted to allow about 6’ of access from one side, or mounted flat, on posts. If desired, the sides could be enclosed with curtains or fence material.

As a place for meeting or entertaining it could fit into most backyards, or any vacant property. As a weekend camp out or an emergency shelter, it could protect a dozen people, with each having about 7-1/2 x 5 feet around the perimeter in which to sleep. This would still leave over 300 sq.ft. (20’ diameter) in the center for common uses, such as dining, socializing, workshop, etc. Additional refinements could be added as resources became available.

The innermost 15’ of the frame could be assembled for about \$200, putting it within reach of a single 20-hour week minimum wage job. This could empower a productive homeless person to begin their own journey back to prosperity. With an ongoing trickle of income it could evolve up to the full 30’.

With the full-scale materials cost (including cover) being less than \$2,000, it would be within reach of individuals and small charities. At this rate it could pay for itself and even produce income to help others. If each of ten residents (or their sponsors) could afford \$20 per week, they could pay off the material cost in less than 2-1/2 months!

The recommended covering is a tough mixture of landscape fabric and a white solar roof coating that has already been proven to last maintenance free for over ten years.

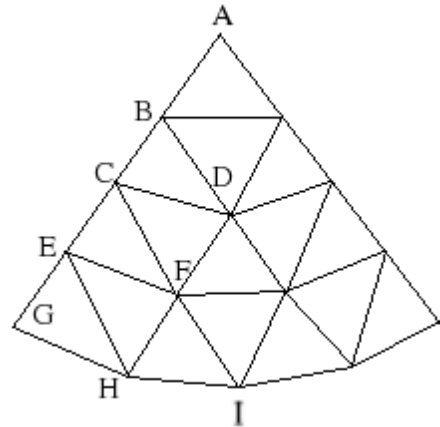
As a bolt-together structure, it can be disassembled for moving or storage in an hour or two, and then stored or reassembled on another site.

| Radius | strut length | +0.1 | qty | total length | pair |
|--------|--------------|--------|-----|--------------|--------|
| 15.00 | 3.7792 | 3.8792 | 6 | 23.28 | DF,BC |
| 15.00 | 3.7500 | 3.8500 | 6 | 23.10 | DF,CE |
| 15.00 | 4.0050 | 4.1050 | 6 | 24.63 | |
| 15.00 | 4.8555 | 4.9555 | 12 | 59.47 | BD,EF |
| 15.00 | 3.8823 | 3.9823 | 12 | 47.79 | |
| 15.00 | 5.4528 | 5.5528 | 12 | 66.63 | CF,FF |
| 15.00 | 4.4222 | 4.5222 | 6 | 27.13 | CF,GHI |
| 15.00 | 4.7031 | 4.8031 | 12 | 57.64 | EG,GHI |
| 15.00 | 3.9071 | 4.0071 | 6 | 24.04 | |
| 15.00 | 6.0274 | 6.1274 | 12 | 73.53 | EH,BB |
| 15.00 | 4.9829 | 5.0829 | 6 | 30.50 | EH,AB |
| 15.00 | 3.9071 | 4.0071 | 6 | 24.04 | |
| 15.00 | 5.1101 | 5.2101 | 12 | 62.52 | FH,GHI |
| 15.00 | 5.4733 | 5.5733 | 12 | 66.88 | FI,CD |
| 15.00 | 3.9158 | 4.0158 | 24 | 96.38 | |
| | | | | sum= | 708 |
| | | | | Sum+25% = | 884 |

The frame is assembled from 3/4” steel electrical conduit. This conduit is cut into the lengths specified in the table, and the final 2-1/2 inches of each end is flattened. (Make sure the ends are flattened in the same plane.)

The various struts are identified by the letters at their ends in the diagram, which is repeated six times around the structure.

One-fourth inch holes for bolts are drilled one-half inch in from each end. Precision is essential, in that there is less than one percent difference in length between struts AB and BB.



The covering

Although it could be initially covered by almost any scraps of plastic or tarp, I would recommend a combination of a polypropylene weed block material (15 year guarantee) painted with a solar-resistant coating (10 year guarantee). Together they form an extremely tough weather proof membrane for a cost of approximately \$0.30 per square foot.

To put this into perspective, consider that the minimum size for a legal bedroom is 100 square feet. You can cover the area of a legal sized bedroom with a weatherproof material that will last maintenance free for well over a decade, for a cost of \$30!

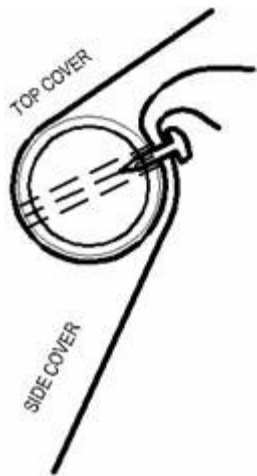
The slope at the top of the dome is quite shallow (it extends outward 39" while dropping only about 5"), so to prevent water from forming puddles in the flexible covering, we should support the covering over the top triangles with a mesh of tightly-pulled wire. The remaining sections would be steep enough to shed the water.

The weed block is painted to the mesh and the dome struts with the solar coating itself. The weed block should be freely overlapped during application, to ensure a complete and leak-proof surface. To further insure a drip-free enclosure, plan to leave at least an inch or two of this covering to extend out over the course of triangles below it.

Because of the extra attention applied to this topmost course of triangles, and the fact that it would be difficult to reach if repairs became necessary, fabricate it as a unit to be hauled to the assembly site when needed.

To simplify assembly, leave the nuts and bolts securing each of the three strut ends in the topmost hexagon in place, and use additional nuts to secure the three strut ends that will be connected beneath each of these points.

I am currently building this one to the full 30' diameter, but the photo shows only the inner two courses of triangle, producing a 15' diameter structure.



The lower sections of membrane might be painted before attachment, and then secured with sheet-metal screws in an overlapping manner as shown in the sketch. This type of seal may also be used for slanting vertical seams in the various sections.

Another option would be to cover the tops of the dome struts with packing tape so the cover could be pulled off, and then fuse the entire cover into a single piece.

The construction techniques and the proportions of the actual struts have been verified in other projects.

The perimeter could be supported upon twenty four (might get away with just twelve) 5' pieces of top rail driven at least a foot into the ground. The top ends of each of these are flattened and drilled so they can be bent over and bolted to the bottom course of struts. With this minimalist support, I would recommend either using guy wires to further secure it to the ground to keep winds from making a kite out of it, or casting the bottoms of the posts in concrete.

This circle of posts may then be surrounded with 95 feet of 4' high wire fencing, that may be left open when used only as a shade structure. Otherwise, it might be covered with tarp, or the weed-block/roof coating mix. The bottom edge of this perimeter material should extend a few inches below the grade of the floor, so that rain water would not flow into the dome.