Parabolic Dome

A common shelter for meeting and preparing meals would be a top priority in an emergency situation, and a bolt-together frame that could be covered with any available material would be a good candidate. A set of struts prepared before-hand would take up little storage, and could be shipped to places in need.

The photo shows a twenty foot diameter parabolic dome that is ten feet tall. Construction is simple: 3/4" metal conduit is cut to lengths, the ends are flattened and drilled, and then bolted together.

At a little over 300 square feet, this could provide emergency shelter for about 15 people (at 20 sq.ft. per person), but as long as we're going to the trouble, a 28 foot dome would provide enough for about 30 people. In addition, since it would be 14 feet tall, there would be a useful overhead space.

For a structure this size you would need thicker tubing. I would probably go with top rail such as is used along the tops of chain link fences.

With a wood-fired cook stove, this structure could provide community meals as well as emergency sleeping space It would remain as a community center long after residents had developed their private dwellings.

If we define both the height and radius as equal to one, we have a surprisingly easy way to calculate lengths for any size dome. The length of a strut is simply the "chord factor" times the radius of the dome. For a dome with a 10' radius, such as the one pictured above, a chord factor of 0.284 would mean a strut 2.84 feet long (0.284 times 10 feet). So if you wanted a dome 5' tall (10' diameter), the strut would be 1.42 feet long (0.284 times 5).

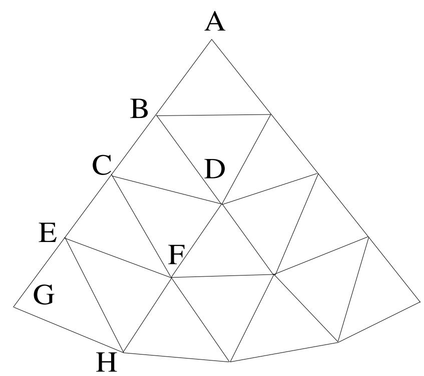
We can also apply this measurement principle to calculating the height of each of the vertices's where the struts meet. The point at the top for instance would have a "chord" factor of exactly 1.

The dome is simpler than it looks. It is based upon a hexagonal pattern, so once you get one sixth of if down, the rest is repetition.

This illustration shows one sixth of a dome. It is different from the one in the photo, because each row (E-F-F-E for instance) of vertices's defines part of a circle, rather than the sides of a hexagon as in the photo above. This is a more stable design in that it makes solid, level contact with the ground.

The vertices's where the strut ends meet are by letters. The individual struts are identified by the pair of vertices's they connect. For the actual data, we can begin by giving the height relative to the radius for each of the points on the dome.

point	height	ht. for 14'
A	1.0000	14.00
B	0.9375	13.125
C	0.7500	10.5
D	0.7500	10.5
E	0.4375	6.125
F	0.4375	6.125
G,H,I	0.0000	0.00



Since values are given in fractions of a foot, use a tape measure that includes decimal fractions. Keep in mind that the distances given are to the centers of the holes drilled. For structures using top rail I would recommend adding about 1/10th of a foot to each length, so about a half inch of tubing could protrude beyond the center of each bolt hole.

Strut Name	Chord Factor	Center-center for 14' height	Center-center plus 0.1 feet
AB	0.25769	3.6077	3.7077
BB	0.25000	3.5000	3.6000
BC	0.31250	4.3750	4.4750
BD	0.36214	5.0700	5.1700
CE	0.40020	5.6027	5.7027
CF	0.45320	6.3447	6.4447
CD	0.25882	3.6235	3.7235
DF	0.41419	5.7986	5.8986
EF	0.26047	3.6466	3.7466
EG	0.50389	7.0545	7.1545
EH	0.55228	7.7320	7.8320
FF	0.26047	3.6466	3.7466
FH	0.50952	7.1333	7.2333
FI	0.52602	7.3642	7.4642
GH,HI	0.26105	3.6547	3.7547