

## EMERGENCY SANDBAG SHELTER (TRAINING GUIDE)



*Emergency Shelter Village*

**Cal-Earth Institute is happy to humbly dedicate the following two pages to the overwhelming requests related to the latest series of disasters in the world (the Asian tsunami, the South American floods, south coast USA hurricanes, Sudan/Darfour's refugees, destructive fires around the globe, the recent disastrous earthquake in Central Asia, especially Pakistan). It is meant as a start to providing guidance for human shelter.**

Notes on the following two pages:

- 1) These two pages can be printed in color, or black and white.
- 2) They can be printed on the front and back of one sheet of paper, strong enough to resist construction site damages. This sheet can also be laminated in plastic.
- 3) Cal-Earth requests your comments after construction site experience (this is a first draft).
- 4) The translation of these pages into the local language is encouraged, along with sending a copy to Cal-Earth.

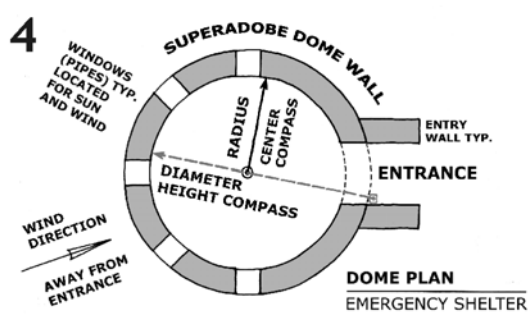
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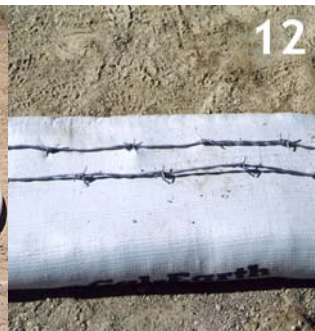
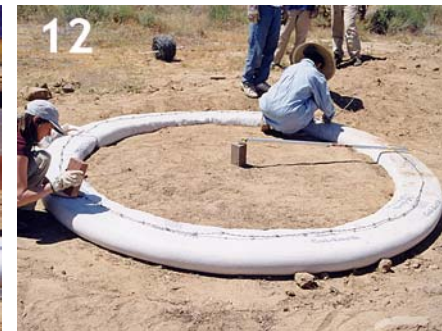
1) Collect the tools above. 2) Prepare the earth mix which is stabilized with cement or lime, or asphalt emulsion. 3) Add enough water to ball together when squeezed, yet not leave the hand wet. If no cement/ lime is available, use raw earth for a temporary shelter. (Experimental - try snow in bags and compact.)



4) Place the door away from wind and water. 5) Dig the foundation trench 30 cm (12") deep. 6) Level and compact. (The foundation will be 2-3 completed bag rows.) 7) Place the bag in the trench, fold the end under to close, and start filling upright like a short column.

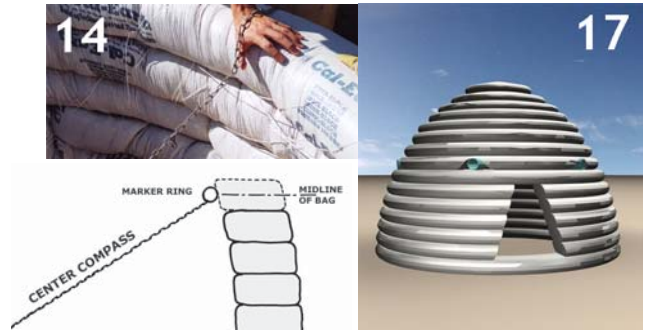
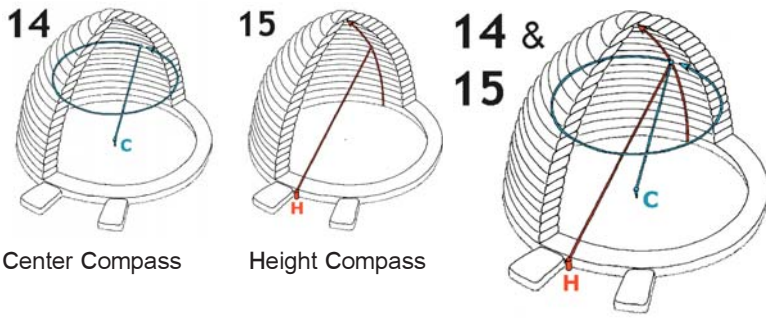


8) Always put in 2-3 cans of earth and shake to the end. 9) Use gravity's help by sloping the bag on your leg, and walking backwards as it fills - do not strain. Let the bag fill as full as possible and check the position with the compass tool. 10) Twist and tuck under the bag ends to close.

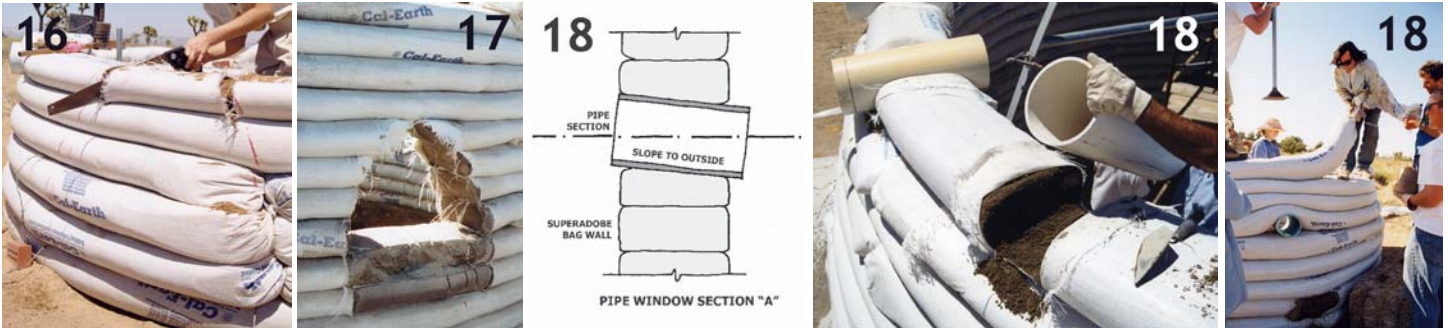


11) Compact the filled bag as hard as you can using a tamper, to make a smooth, solid, uniform block. Only compacted earth becomes strong. 12) Attach continuous barbed wire - 1 wire for domes up to 4m (12 ft), 2 wires for bigger. Where breaks occur, overlap the wires by 2ft. (65 cm). 13) Continue coiling bags.

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14, 15) You must use 2 Compasses to make the dome shape. Use chains or other non-stretchy cable-ropes. Attach one in the center (Center Compass), and extend the length at every row according to a second one at the perimeter (Height Compass). **If any bags do not conform to the compass remove them and re-build.**



16) Pre-cut bags for a doorway knock-out panel. Stabilized earth must be cut after tamping at every row - don't let the cut stick back together. 17) Punch out pre-cut panels to open after a min. of 5 rows, or when the dome is completed. 18) Insert pipes for windows sloped to outside for rain.



19) Coil upper rows, but don't stand on the wet bag. 20) Fill and place bag above the row below and work it inwards to meet the compass circle. Tamp the bag with gentle slope to outside. 21) Add an arched entry (door vault) to the opening to buttress and protect the entrance. Entry is arched or sloped, short or tall.



22) Plaster the exterior before bags disintegrate and 23) waterproof with locally suitable materials to resist moisture and erosion. 24) On top, finish with a water-resistant cement/lime plaster such as Reptile (cement or lime mud-balls) layered from bottom to top, or 25) a smooth cement or lime plaster finish.