

THE YURT: An Excellent Low-cost Home ASPI Technical Series

INTRODUCTION

A yurt is a common Mongolian circular house or tent found on the Asian Steppes, which, instead of a traditional construction frame, is made from skins and poles and is held together by a rope wrapped around the circumference of the building just below the eaves. This binding cord holds the walls and roofing slats much as a barrel hoop holds the staves in place and is still as rigid as any framed building. For the Mongolians this may be a permanent or mobile structure and was virtually the only structure known in their nation until recent times. "It provides the space in which every category of person or object in the nomad's world could be located, and so becomes a kind of microcosm of the social world of the Mongols."⁽¹⁾

We are also nomadic people using automobiles instead of horses. The circular features have instant appeal to persons of many cultures and such structures fit readily into curved and mountainous landscape -- and rolling and level areas as well. So the yurt can be conceived as Mongolia's gift to the world -- even though very few are found outside of that land.

ADVANTAGES OF A YURT

Appropriate technology may be conceived of as the Western culture's creation to be applied or appropriated to the rest of the world, or as the whole world's collective experience that needs to be shared with others. It is the second interpretation that we subscribe to at ASPI. The yurt can become globally applied and has these advantages:

- * Very low cost per square footage of the building. A 133 square foot yurt (a moderate size room) costs only about six dollars per square foot not including any toilet or water facilities. See listing below.
- * Speed in construction since a frame is not necessary. A yurt could be built by two persons in a week or less depending on whether some extra help is obtained for tightening the cable.
- * The rugged and flexible structure can withstand major shock from earthquakes better than concrete foundation buildings. This same advantage could apply to other wooden foundation buildings as well.
- * Ease in maintenance. The yurt contains a most simple design requiring little maintenance and all areas of the building are easily accessible. No dangerous and difficult roof climbing is involved.
- * A fairly snug and rain-proof structure. A yurt does not have complicated corners like geodesic domes but smooth rounded sides. Overhanging eaves can be constructed to protect the siding.
- * While on the inside one feels that the room is larger than it actually is. This sense of spaciousness may be due to the unusual interior shape of the structure and to the skylight as a source of natural lighting.
- * The architecture of the yurt is uniquely beautiful and the appearance is pleasing to the eye. We have had many compliments on our ASPI yurt nestled on its hillside setting. This is one of the most aesthetically pleasing low-cost buildings in our part of the country.
- * It is ideal for dwellings and other small low-cost structures required for visitors, refugees, retreatants, hikers and others.
- * The design is adaptable to any culture. While this building is somewhat Asian in concept and appearance, we do not feel obliged to stay with previously defined "Appalachian" designs. It is ASPI's philosophy that design and concepts take little physical energy to communicate from one place to another, whereas building materials are bulky and do. The challenge is to adapt other people's ideas while using native building materials as much as possible.



YURT AT ASPI



ADDRESSING NEGATIVE REMARKS

One complaint is that the building cannot be adapted to traditional rectangular and square furniture. This need not be a major problem as cushions, floor enclosures, wall seats, shelves, futons and bed mattresses, which fit the contour of the walls, can replace traditional chairs, closets, sofas and beds.

Another criticism often voiced is the possibility that the neighbors will not like a yurt, due to its temporary or foreign appearance. True, peer pressure does dictate the same ranch-type housing from Alaska to Florida, thus adding enormously to the material, heating and cooling costs of our economy and to the monotony of our landscape. Yurts are for those daring to be different. Neighbors might learn to admire them and move on to do more creative things themselves.

A more substantial complaint is that there is not enough lower portion window space. We have found that the skylight does provide for a sense of light and air. An additional window can be cut in the door with a minimum of difficulty. It is possible to insert windows in the wall but is it really necessary? If one needs outside space, building a platform, porch or patio is an option.

A final complaint is that the amount of work per square foot can be quite high, even though it is not necessarily expert or heavy duty work as needed for framed buildings. The great savings are in materials, As one would expect, yurts are favored more by those desiring communal, voluntary, two-person work trading, or do-it-yourself building operation.

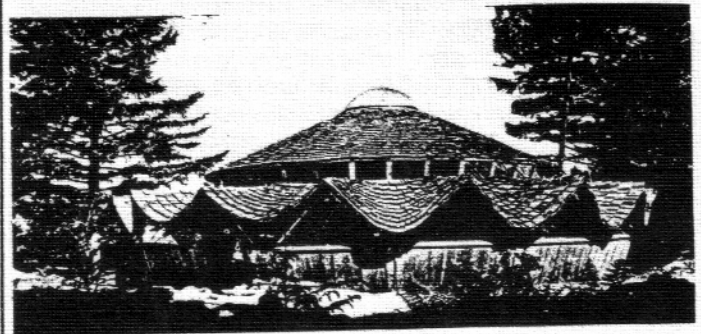
VARIETY IN YURT DESIGN

The yurt is generally a single room in which the inner circle gives a unity to the structure and allows for a feeling of wholesomeness and well-being. It is quiet, creative and gentle space with none of the harshness of square cornered buildings. This writer has found yurts ideal for making retreats and for reflection. The single circular enclosed space has an advantage which can only be understood by experiencing it.

Having said this, variety can be added by enlarging the enclosed space and partitioning walls and building concentric inner circles as turrets within the upper center of the yurt space. These design modifications can be as elaborate as one might choose.

While Mongolians make yurts from hides, poles and ropes, Western appropriate technologists seek to make them from materials which are at hand. This follows the principle of always obtaining bulk items (food, water, fuel and building materials) from local sources. We at ASPI used rough-cut pine for the walls and a recycled steel cable for the holding device.

The roof can be made using purchased three-quarter inch plywood and later asphalt roll roofing and plywood. The painted and caulked plywood roof which was first placed on ASPI's yurt lasted only four years. Since plywood glues are water soluble, even painted roofs do not last long before edges begin to unravel. Some yurt dwellers cover their roofs with tar but this looks somewhat unappealing. We have found that treating the plywood with Thompson's Water Seal® and covering it with asphalt sheeting, after filling the valleys with wooden strips, caulking and aluminum flashing has proven sufficient to hold the roof in place with minimum deterioration.



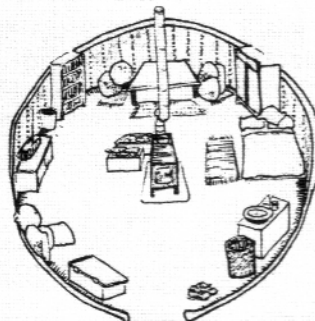
Yurt at Woodlands Mountain Institute in West Virginia

USE OF YURTS

Due to the yurt's advantages, we propose the following non-exhaustive listing of uses.

- Adunct bedroom to house
- Demonstration center office
- Small variety shop at park
- Hermitage for single person or couple
- Shelter in remote areas (modification of roof construction could allow for such. All our materials were packed to a site about 400 feet up a very steep trail.)
- Meditation room
- Overlook on prominent peak
- Bunkhouse for overflow
- Tool room (concrete floor may be desirable)
- Chapel
- Learning center at an educational institution

- Recovery ward at a health facility
- Private residence
- Tree-house
- Shelter on trail
- Room for a teenager
- Quiet getaway space



INSIDE
OF A
MODERN
MONGOLIAN
YURT

CONSTRUCTION STEPS

The following are steps to construction of a yurt, but most builders may desire more details. We strongly advise you to write for instructions (8 ft., 10 ft., or 17 ft. diameter building plans) to William S. Coperthwaite, The Yurt Foundation, Bucks Harbor, ME 04618.

1. Site Selection and Preparation

As in all buildings, this is the greatest energy saving step. If one uses sunny areas and yet has a place which contains natural wind breaks, much more savings can accrue -- when building for winter. If one selects a shaded and airy spot for summer, much more cooling results. We had summer in mind with our yurt site. Clear site and level ground.

2. Foundation

The placement of the foundation posts depends on the size of the structure intended. A placement of posts in the fashion shown here - around the edge with one in the center.

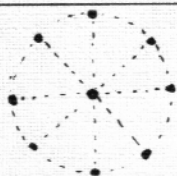


DIAGRAM OF
POST PLACEMENT

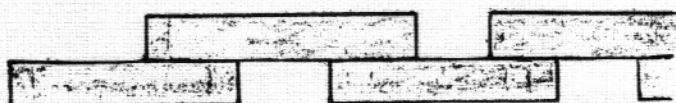
ASPI used 4 inch treated pine posts. Some builders prefer 2 inch steel pipe. Extend posts below the normal frost line and enough above ground to allow air circulation and crawl space. Framing uses 2 by 6 inch boards with filler blocks for making the curvature of the platform's outer edge.

3. Flooring

If the building is to be insulated a double platform could be constructed. The lower portion could be 1/4 inch plywood (treated) and 3/4 inch plywood for the upper layer with insulation between. This is more easily built apart from the foundation posts. The finished platform is then carried over and secured on the posts. If the platform size is too large to lift the lower layer may be rigid foam insulation board fitted in place before a top layer of plywood flooring is added.

4. Walls

Depending on the size of the structure both inner and outer planks (for example 1 x 12 inch pine) are pre-cut. The outer walls will stretch from eave to bottom of platform and will be a little over 10 inches longer than the inner ones.



WALL LAYERS

The inner boards are toe-nailed to the floor about 2 inches in from platform edge in a stepped fashion, and propped up so that the cable can be wrapped around and tightened. This is the most difficult operation and may require additional people. The inside face of the inner wall may be planed smooth for painting.

The outer wall planks are attached after the roof is in place and are about 3 1/2 inches out from the inner ones which allows for insulation.

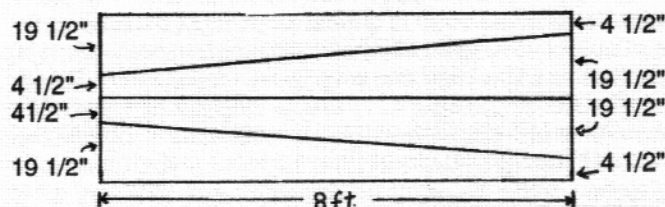
5. Cable

The key to yurt stability is the binding cable under the eaves, which holds the wall in place. For durability and stability this cable should be galvanized steel and of at least 3/8 inch thickness. The cable is held in place by ring nails, steeples or nails that are bent to form a ring. The ring of cable is placed just below the upper edge of the inner wall and this is tightened and held by cable clamps.

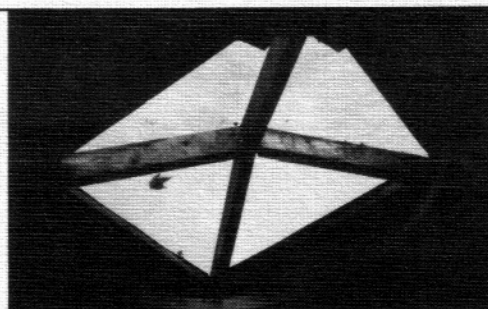
6. Roof

Several designs are possible. The ASPI summer structure has a ribbed roof composed of 46 3/4 inch plywood strips cut so that they are narrow at the top and wide at the bottom.

PLYWOOD CUTS



Roofs for insulated ceilings are 1 inch planking cut in widths like the ribbed counterpart but the outer planking is in lengths that are about 9 inches longer.

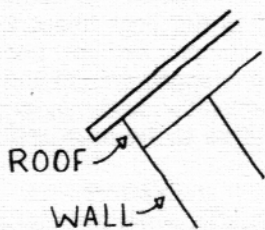


SKYLIGHT OF ASPI YURT

The circle at the skylight is a compression ring about 40 inches in diameter. The ribs or planks fit against this. The rim of a wagon wheel is suggested.

Due to the harsh weather conditions that the roof is exposed to we suggest:

- watersealing the ribs
- cut triangular blocks to fit into the valleys after caulking
- flash the valleys between ribs
- cover with asphalt shingles or roofing tar



ROOF - WALL ATTACHMENT

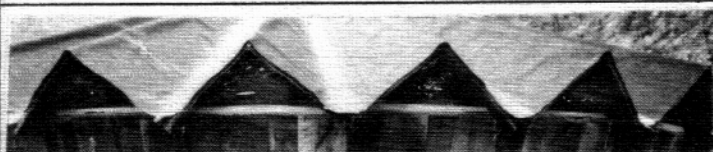
TOOLS

Digging tools
or sledge hammer
Hacksaw
Hammer
Knife (strong)
Level
Measuring tape
and string

Sawhorse
Saws (skillsaw and
crosscut)
Square
Step ladder
Stapler
Stretcher (fence)
Winch

7. Windows

Windows may be glass or Plexiglas. The skylight may be a single piece or double glazed, which is fitted into place and bordered for tighter and more permanent placement. Windows may be added but this is a delicate matter given the shape of the building and normal rectangular window frames. The ribbed roof technique allows for small triangular windows (one for the end of each rib) around the eaves. This gives an airy appearance and is quite cool when the glass is replaced with screens in the summer.



WINDOWS OF ASPI YURT

CONSTRUCTION COSTS

The major portion of the ASPI building was assembled as part of a one-day "Yurt Workshop". Total construction cost was about six dollars per square foot. A totally insulated building could total about one thousand dollars.

Footers - (11) 4 inches wide and 4 feet long	\$ 44
Floor joists - (10) 2 by 6 -- 8 feet long	40
Flooring - (6) 4 by 8 paneling	45
Nails, carpet tacks and fasteners	40
Caulking - 6 tubes of good grade	24
Planking - (60) rough cut -- 1 by 12 inch pine	90
Plexiglas - 2 grades (skylight and window)	120
Trim for windows	20
Homemade door, hinge and latches	30
Flashing for roof and asphalt sheeting	60
Plate and valley boards	45
Paint and waterseal	60
Floor covering	75

8. Insulation

Some prefer a building meant for winter use. For those who insulate, the outer and inner surfaces of the floor, walls and ceiling need to be filled with proper insulating materials. Doors should be fitted and windows double-glazed. The insulated buildings require somewhat more material to build. Insulating and caulking will run the cost about 40% higher than for summer structures (see the list of materials).

9. Finishing Touches

If the interior side of the planking is planed, the walls can be painted and decorated. Weather strips, trim and bordering may be added according to the builder's desire and expertise. Some like to build more elaborate benches and storage areas around the base of the floor.

NOTE: Those inexperienced in carpentry should seek advice by visiting and talking with individuals who have some hands-on experience in yurt construction.

MAINTENANCE

ASPI has used its thirteen-foot diameter, 133 square foot building for nine years. We did replace the roof but that was due to not following experienced advice and preferring a white painted rood that could not withstand the weather. In fact, except for the roof, the building is essentially as when made. The skylight was a single flat sheet and a heavy wind storm blew it off. A second was fashioned in a cap design using the same Plexiglas as the first and has withstood the weather quite well.

ASPI has installed a rug, the gift of the National Cathedral in Washington. The yurt has been used as a meditation room for a number of years and also as a hermitage and sleeping place for visitors. The building and nearby nature trail were dedicated in September, 1982 to the late Cherokee chief Sequoyah.

REFERENCES AND RESOURCES

- (1) Caroline Humphrey, "Mongolian Yurts", NEW SOCIETY, October 31, 1974.
- (2) The Yurt Foundation, Bucks Harbor, ME 04618.

Discussion of Traditional and Modern Yurts

- (3) SHELTER, 1973 (back in print, 1990), Ten Speed Press, P.O. Box 7123 Berkeley, CA 94707.

Discussion of Traditional Yurts

- (4) E.M. Hatton, THE TENT BOOK, Houghton Mifflin, 1979.
- (5) SHELTER II, 1978, Shelter Publications, P.O. Box 279 Bolinas, CA 94924.