"Bamboo – a traditionally dependable building material and its future in the building industry of Manipur"

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Role of Bamboo in Manipur

- Manipur is in Earthquake Zone V.
- Bamboo structure perform well in earthquake prone areas.
- Bamboo structure has proven its dependability against natural calamities.

Contd.

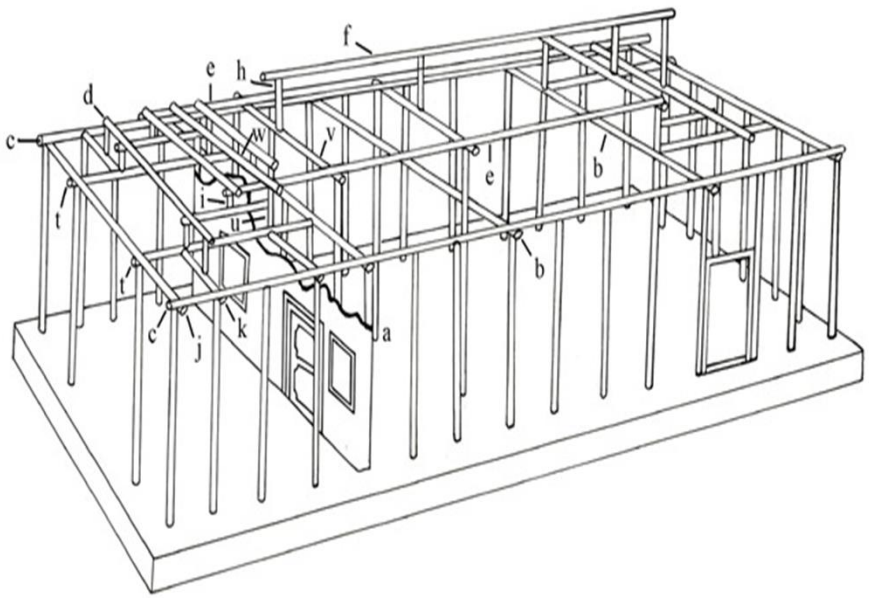
- Bamboo is renewable and versatile resource having good tensile strength.
- control the carbon dioxide pollution as well as Effective for prevention of soil erosion and flooding.
- Restore the usage of bamboo in modern construction.

Traditional Bamboo House in Manipur

Traditional Bamboo House in Manipur

- The inhabitant of Manipur used to live in a house where most part of the house was built with bamboo individually or in combination with other materials like mud, wood, thatch etc. in walls, roofs, columns, beam etc.
- A “Meitei Yumjao/Traditional Bamboo house is built with bamboo of different species as per the requirement of strength and size.
- Khokwa being stout and thick, small in diameter is used as purlins and rafters.
- Utang for Kanam and chepsi paya.
- Paya and cane are used with locally developed techniques and styles for fixing and joining .

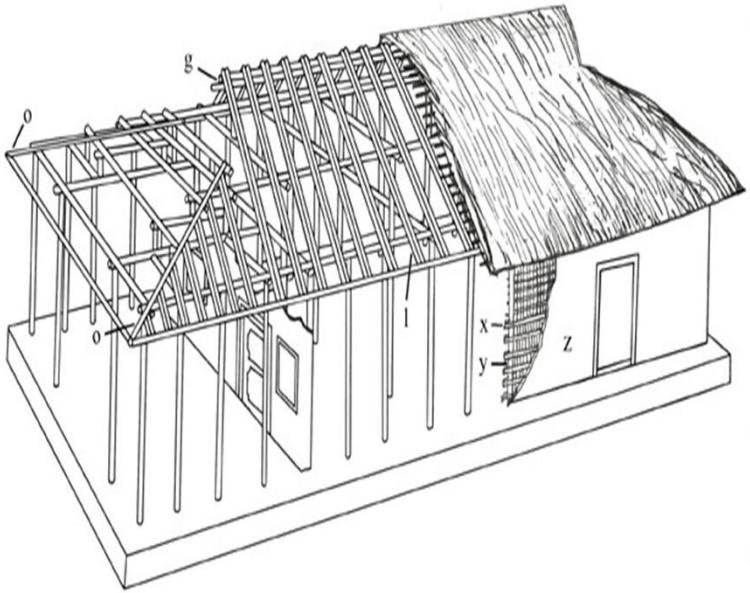
Traditional Bamboo House



Structure of a Meetei/Meitei yumjao

a. Urep (main pillar)
b. Khangel (cross pole)
c. Loikhang (lower horizontal pole)
d. Thabakkhang ashangba (lower cross support pole for roof)
e. Khangabu (upper support)
f. Yangbi (main horizontal pole)
g. Yangnam (horizontal pole for securing of the roof support)
h. Sanayumbi (vertical support for main horizontal support pole)
i. Khongtenba (short-leg vertical support)
j. Maigei (cross pole)
k. Akhuba (short support pole)
l. Humdang (lower roof support)
o. Sega (slanting poles)
t. Shuktu (horizontal support pole)
u. Khongshangba (long vertical support)
v. Khangabu atenba (cross support pole)
w. Thabakkhang atenba (cross support pole)
x. wachet (split bamboo)
y. Shinghoot (Phragmites)
z. Wall plastered with earth and straw chips

Traditional Bamboo House



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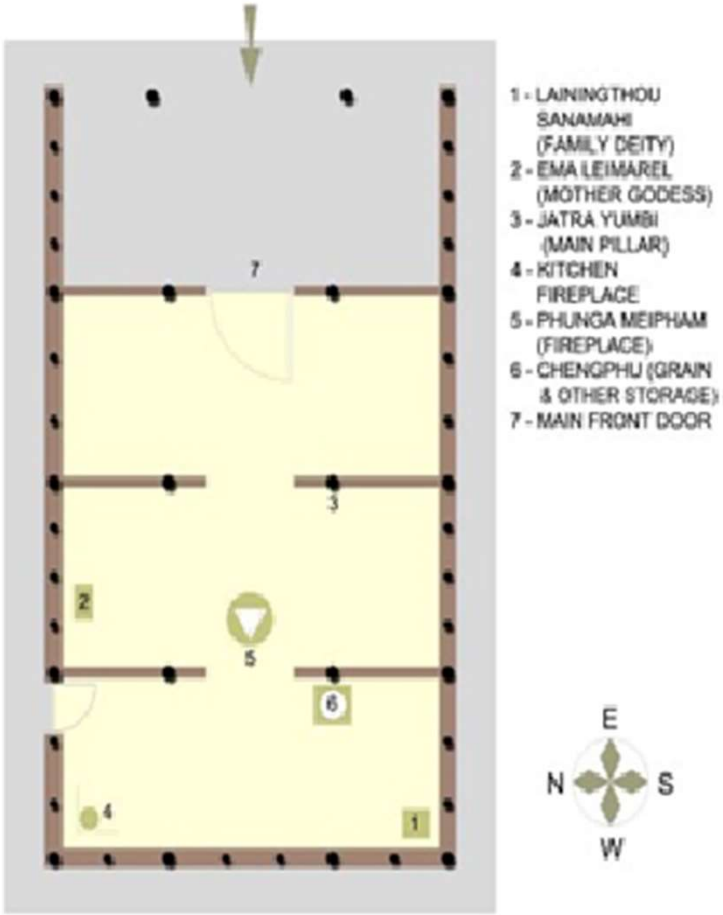
Traditional Bamboo House

- Meitei Yumjao is the single largest dwelling unit in which there is no separate room but it was arranging in the descending order from the elder to younger one including Sanamahi Laipham (Family Deity) at the side and kitchen at the rear of the house where phunga meipham is located.

- Phunga Meipham act as a gathering place for all the family members at the end of the day after their long tiresome work, which will be entertaining with phunga waries.



Traditional Bamboo House

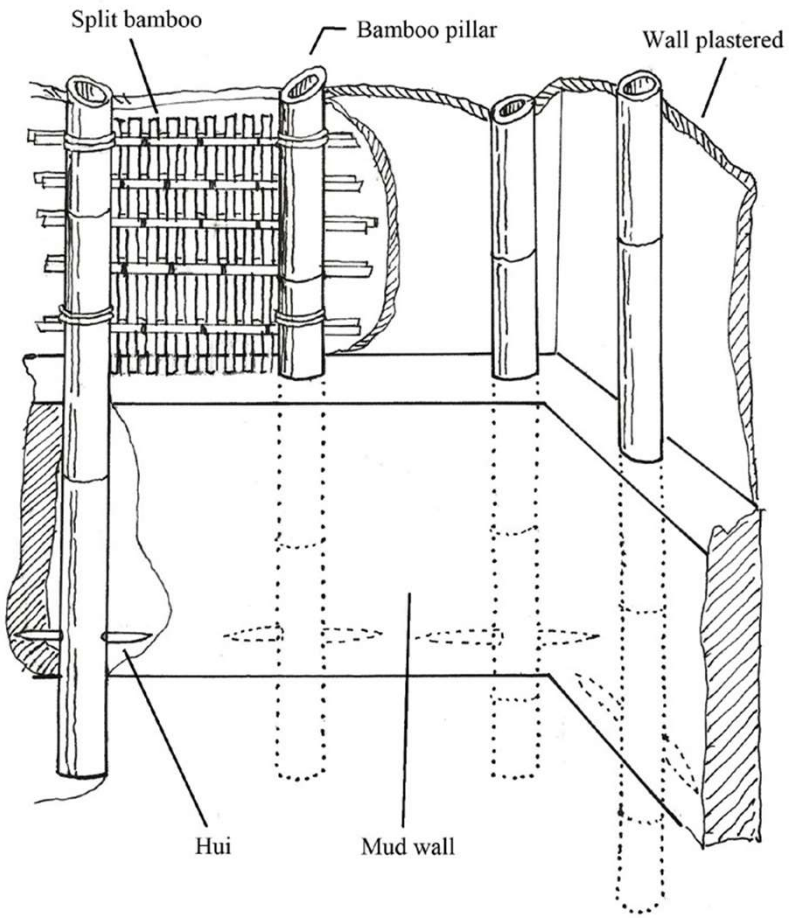
ROOM LAYOUT

Traditional Bamboo House

The Meitei Yumjao is divided into two types depending upon its wall construction –

- Wall of split bamboo mats with straw reinforced mud applying on both sides up to roof height, embedding the main load bearing bamboo posts with Pungjei in different heights to act as shear connector.

- Wall of split bamboo mats on both sides
  up to a height of 4 to 5 feet only and the wall above with only split bamboo / Shinghoot distributing uniformly with mud plaster on both sides.



Bamboo Traditional House

- Roofing is done by thatching over either bamboo or wooden truss.
- The thatch were fastening by using split bamboo in both upper and lower side of the roof.
- Thatch roofs replaced once in eight to ten years,
- It is an excellent sound absorbing or insulating material.

Traditional Bamboo House

- The lashing joint technique was adopted.
- The joint consist of two bamboos , a bamboo with a small diameter which serves as a beam is connected with a bigger diameter bamboo which serves as a column.

Bamboo Truss

Wooden Truss

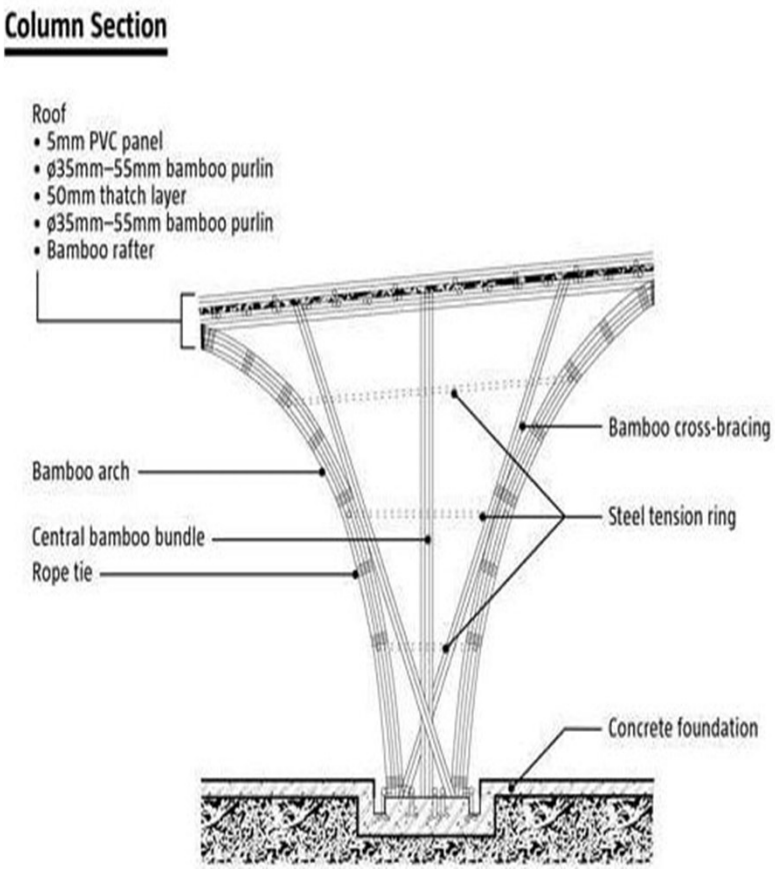
Traditional Bamboo House

- The integral building design of “Meitei Yumjao” and the adoptions of symmetrical designs had shown a great sense for architectural and structural design of the houses.
- The “Meitei Yumjao” has lots of limitations in fulfilling the present day requirements particularly with regard to sanitary, lighting, health and privacy.
- Bamboo has the potential to be used in all parts of a building as architectural and structural elements.

Study of Bamboo

- Adoption of the recommended species
- The observance of recommended felling method and timing, seasoning and preservation and the right construction practices are indispensable
- More research and investigate work to improve the bamboo joinery required.

Bamboo Joints



Bolted joint provides an easy workability, high durability and capability to connect many bamboo poles, making a building frame with more than two layers easier.

Bamboo Joints

- Bamboo joining section must be as close as possible to the nodes.
- Bamboo having regular lengths of internodes as far as possible must be selected.

Bamboo Space Structure Joint

Eating Space

Garden Benches

Bamboo Space Truss

Bamboo Skeleton Roofing

Bamboo wall panel

Bamboo household product

Bamboo as decorative items

Bamboo Ceiling

Bamboo Shed

Bamboo Structure

Conclusion

- Restoring the usage of bamboo as construction material due to its easy availability and workability in the modern construction industry.
- Bamboo can be widely utilised for structural and non-structural parts of the structure and household products.
- With the new technology of preservation and seasoning, more durable and economical bamboo structure ranging from multi-storeyed to farm house, resort, shed etc. can be constructed.

THANK YOU