

Wood and bamboo panels for drywall

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Abstract

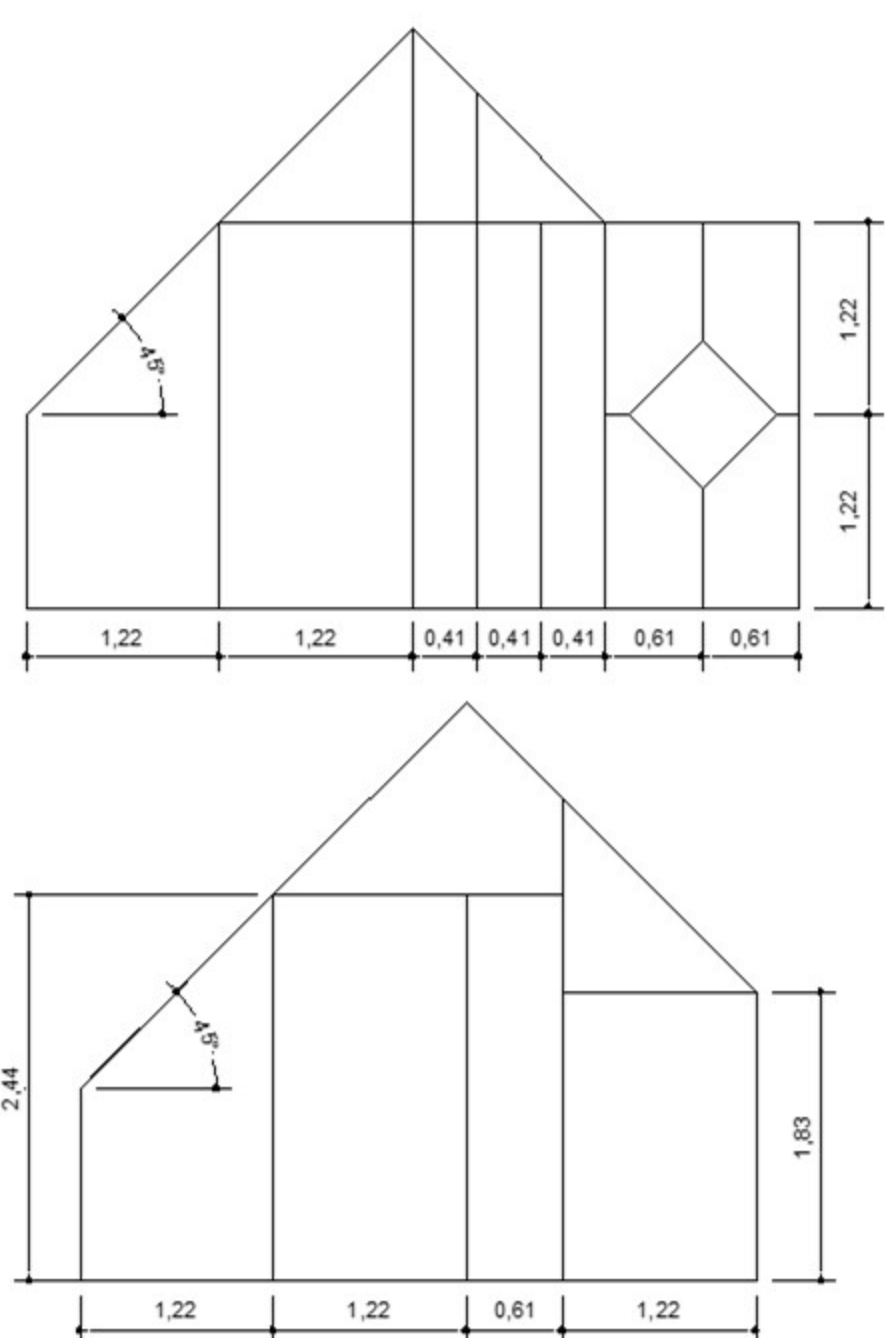
Bamboo is the most renewable material in nature, and also has low embodied energy throughout the manufacturing, and the ability to sequester high amounts of CO₂, resulting in products that are renewable, alternatives for the construction industry. For this system of walls made of wood and bamboo panels is presented with an innovation that eliminates nail joints, and integrates bamboo columns, beams, and wood sheets for rigidity. Reduced bamboo was used to obtain two flat faces 0.12 and 1.22 m long, PVA-based adhesive attached with manual presses to two sheets of plywood measuring 1.22 x 1.22 x 0.018 m. The preliminary results of modulation with the Colombian standard NTC 45 on modular coordination of construction; and the diagonal load are acceptable, the adhesive bond between wood and bamboo is efficient with resistance for the entire system of 42463 Nw / 3329 mm² diagonally to the frame, compared to a full-size model and a simulation in Ansys® software. It is recommended to expand the sampling and avoid delamination between the plywood veneers; It is concluded that it is technically viable, and its manufacturing is faster because it eliminates diagonals and nails.



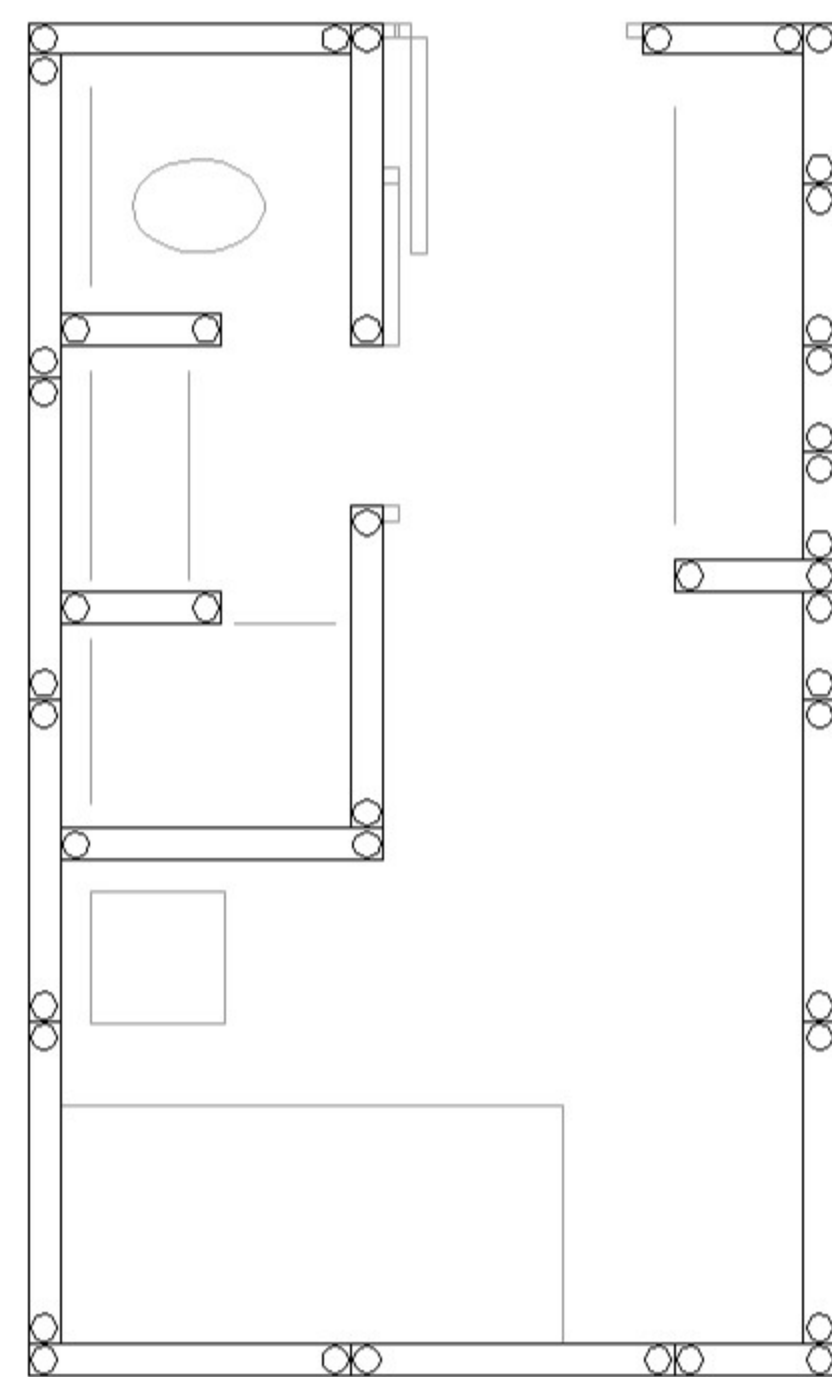
Panel prototipe

The use of elements in bamboo is joined with sheets by nails, staples, or screws. Then, a solution is to join it with adhesive. Both plywood and oriented strand board have perpendicular fibers, so they can theoretically be structural. The innovation consists of replacing the screws that join the sheet and the vertical with adhesives; This can be done because bamboo can be cut lengthwise to have two flat faces, thus, it is manually pressed to a sheet of wood obtaining several contact points between the sheet and the flattened bamboo

Result

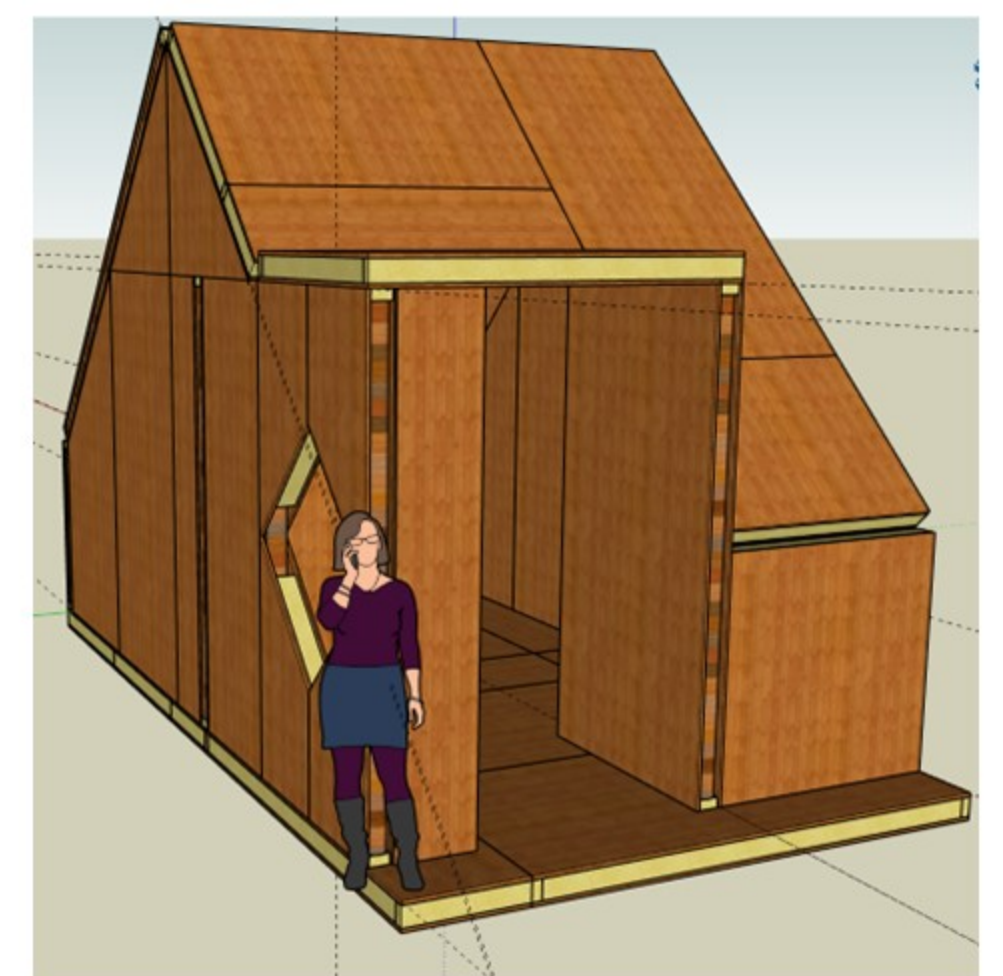


Elevation



Plans

The minimum construction unit is made of a bedroom, shower, and toilet. It has a 45° diagonal geometry without waste, cuts, and a rigidity system



Modulated and prefabricated assembly

Analysis

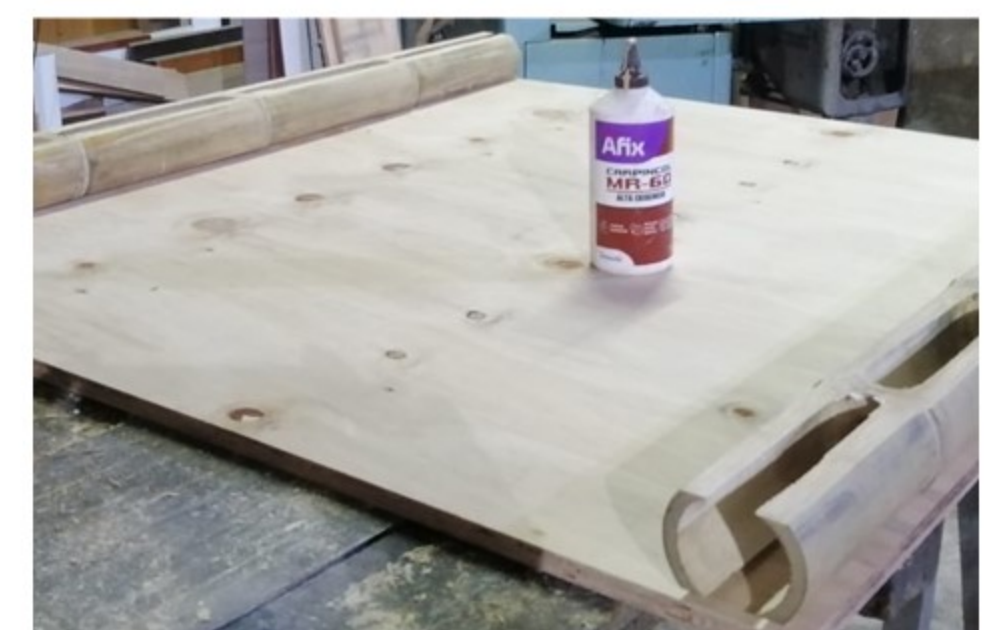


Diagonal panel test. Cañon J., 2023

The result in a diagonal load before the failure limit demonstrates the possibility of horizontal loads. With a full-scale prototype, the failure of the elements is analyzed, and with a resistance of 42,400N / 3300 mm² Cañon J., 2023

Conclusion

Reduction time in joining and no metal connectors (nails, staples, screws) must be analyzed and compared with the adhesive for costs.



Building proces

References:

Cañon J., (2023) Elaboración y Caracterización de Panel Elaborado con Contrachapado y Guadua

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