

Abstract

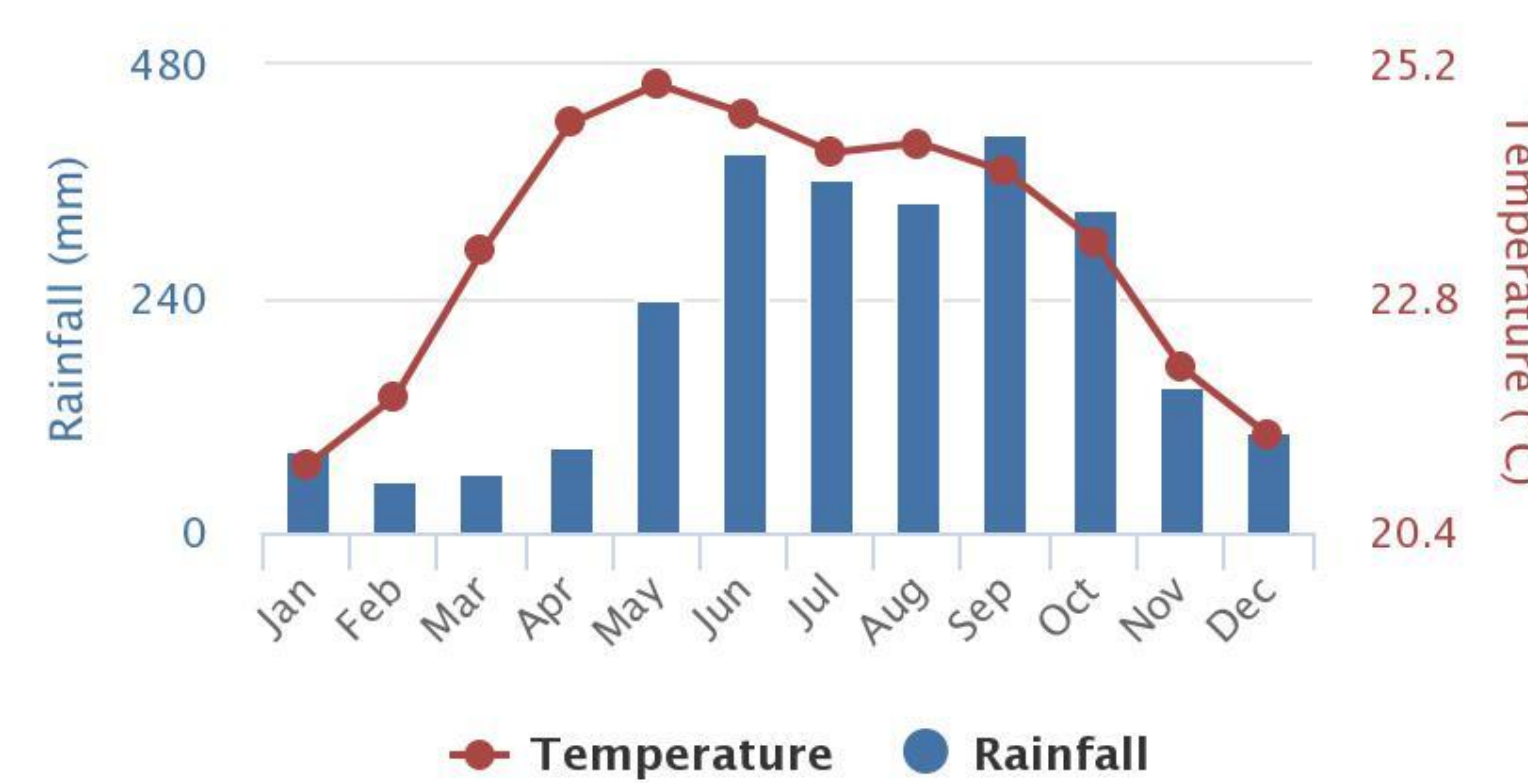
This project is a design of permanent housing for the Quiché people in the central highlands of Guatemala. This area is faced with occasional earthquakes, high winds, and rain which are caused by the hurricanes that hit the coast of Guatemala.

Background

- Most Quiche families live in a family unit of four.
- They usually live in two room houses that develops as the family grows in status. They also usually have a corredor which is a porch/separate section where people cook.
- Running water and adequate sanitary facilities are lacking in most homes.
- The central highlands aren't directly hit by hurricanes but instead tropical storms. Creating an extreme rainy season.



The Quiche people live in the central highlands of Guatemala.

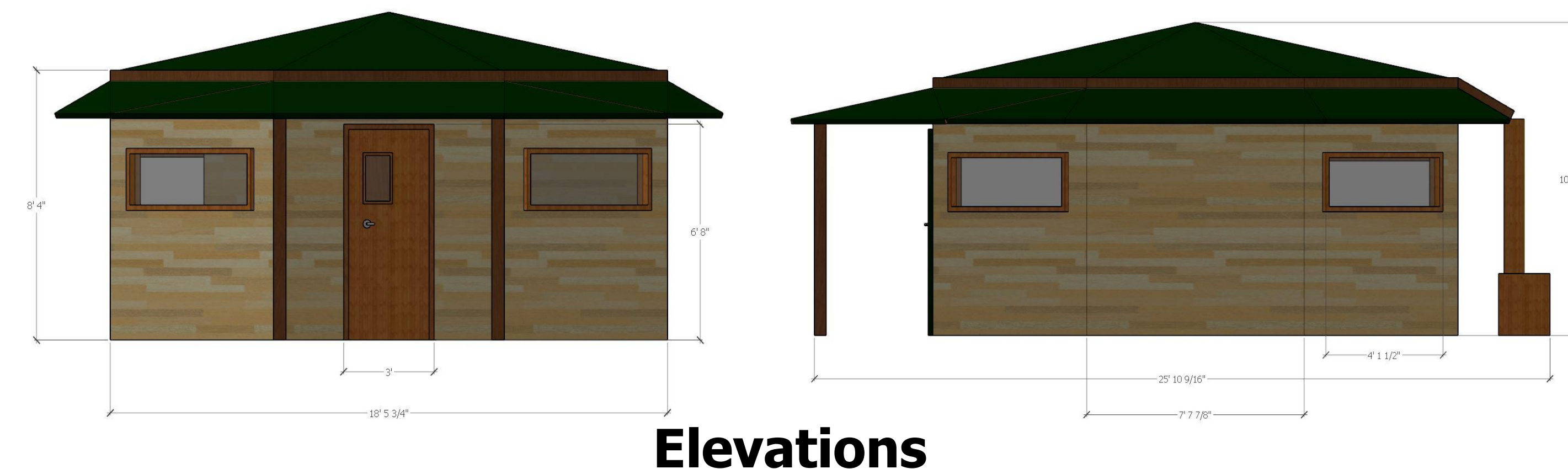


Guatemala experiences heavy rainfall June to October. This affects the soil where we will be building.

Design Documents



Final Design with bamboo walls and thatched roof



Elevations

Case Study

- The Round structure of the house comes from the research done by Deltec Homes.
- Deltec Homes is a company that designs round homes which withstand some of the worst US hurricanes in Florida.
- Their housing design was our starting point for hurricane resistant housing.

Floor Plan



Floor plan for inside the house (bottom) Pila outside a house (top)

- The 300 square foot house is facing south to reduce glare and direct sunlight into the house, in the morning and night.
- The water collection system supplies the pila, a cultural item seen to the left, that is used for collecting water, washing clothing, bathing, and washing dishes.
- A pila is basically a concrete basin with a scrub board attached. It is made of 4" concrete block with plaster and skim coat to prevent the water from seeping out.

Design Concept

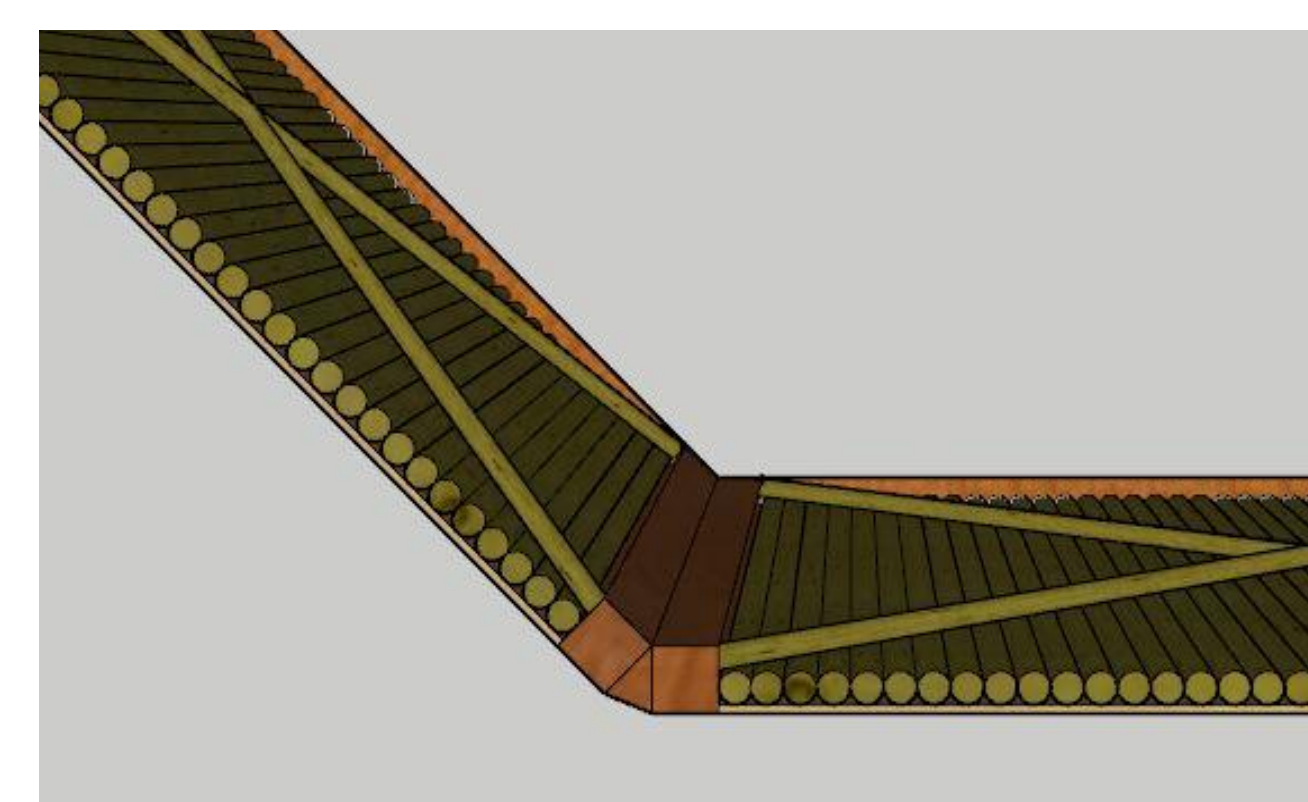


The roof uses a system of gutters to collect and funnel water into a cement storage unit.

- A two foot overhang surrounds the house preventing water from running down the walls of the house.
- The roof is made of thatched leaves.



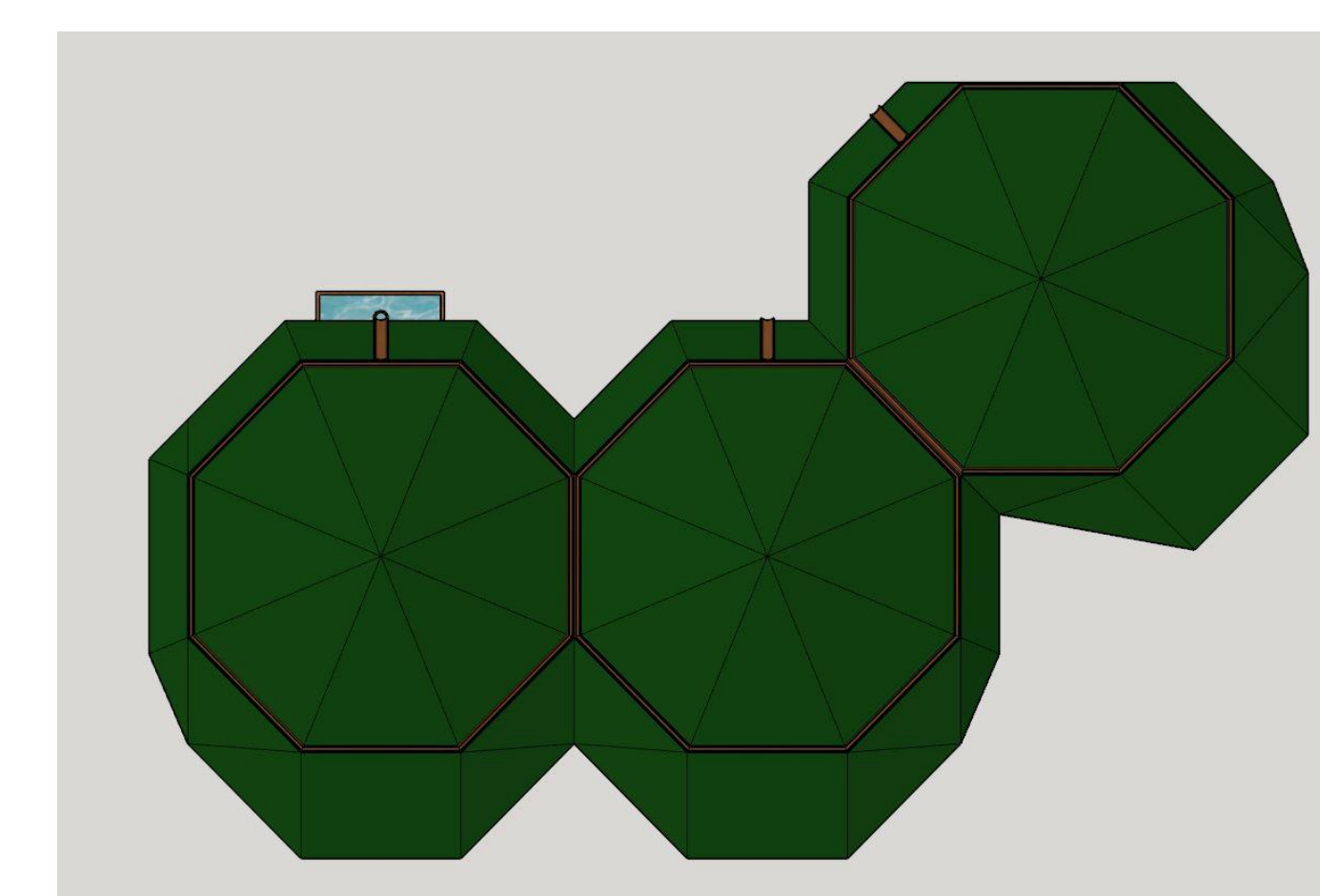
The low pitched roof, with a slope of 6/12, allows wind to pass over the top with ease.



The walls are lined with 2" of bamboo then 1/2" of plywood and then, on the outside, a waterproofing membrane to prevent leakage.

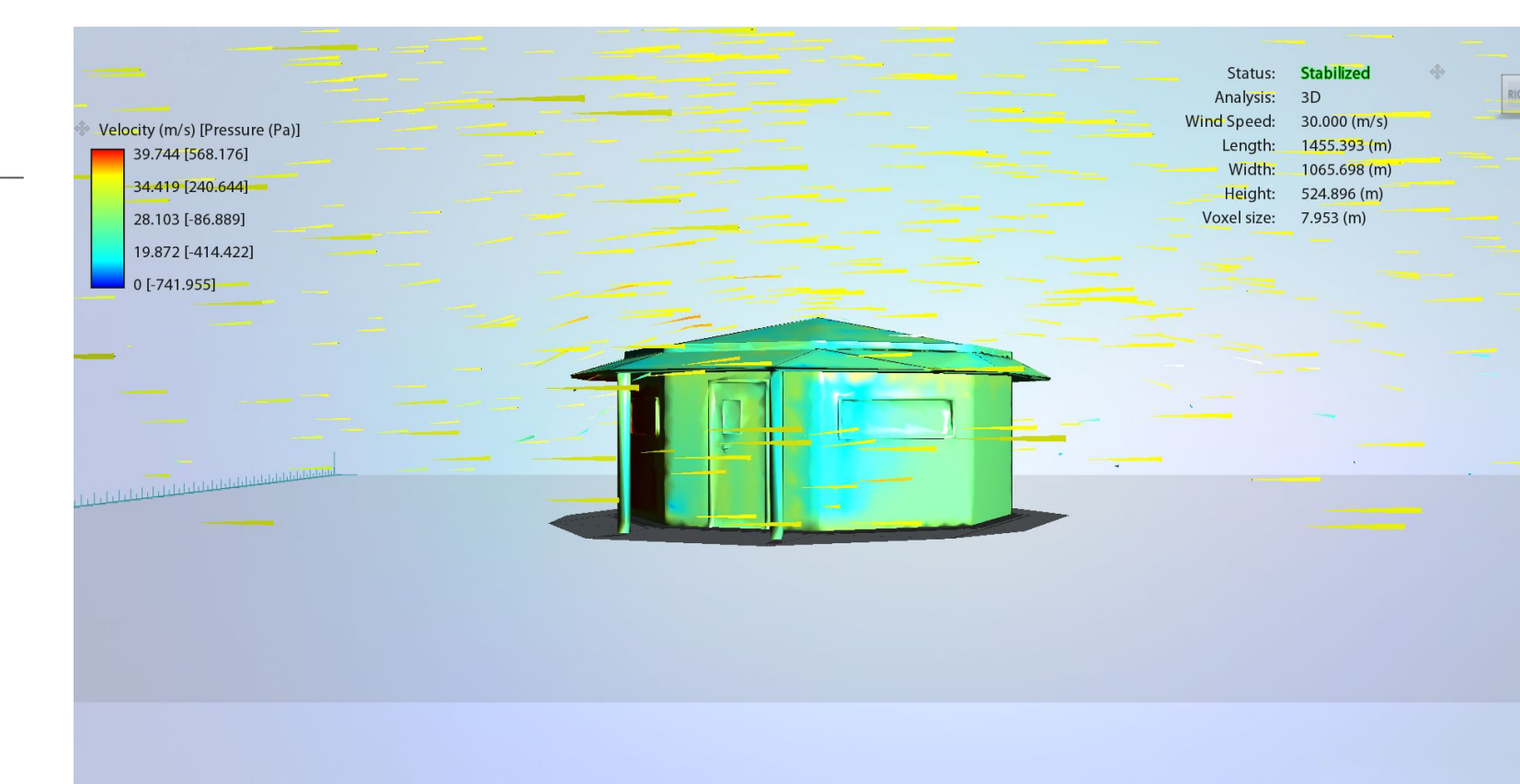
- Cement floors cover the whole inside of the house to increase sanitation.
- A porch extends out above the front door to create an outside living area.

- 4x4" lumber posts are put at each turn of the house for stability.
- Cross beams were added, similar to a yurt's structural design, to the walls to create additional stability.

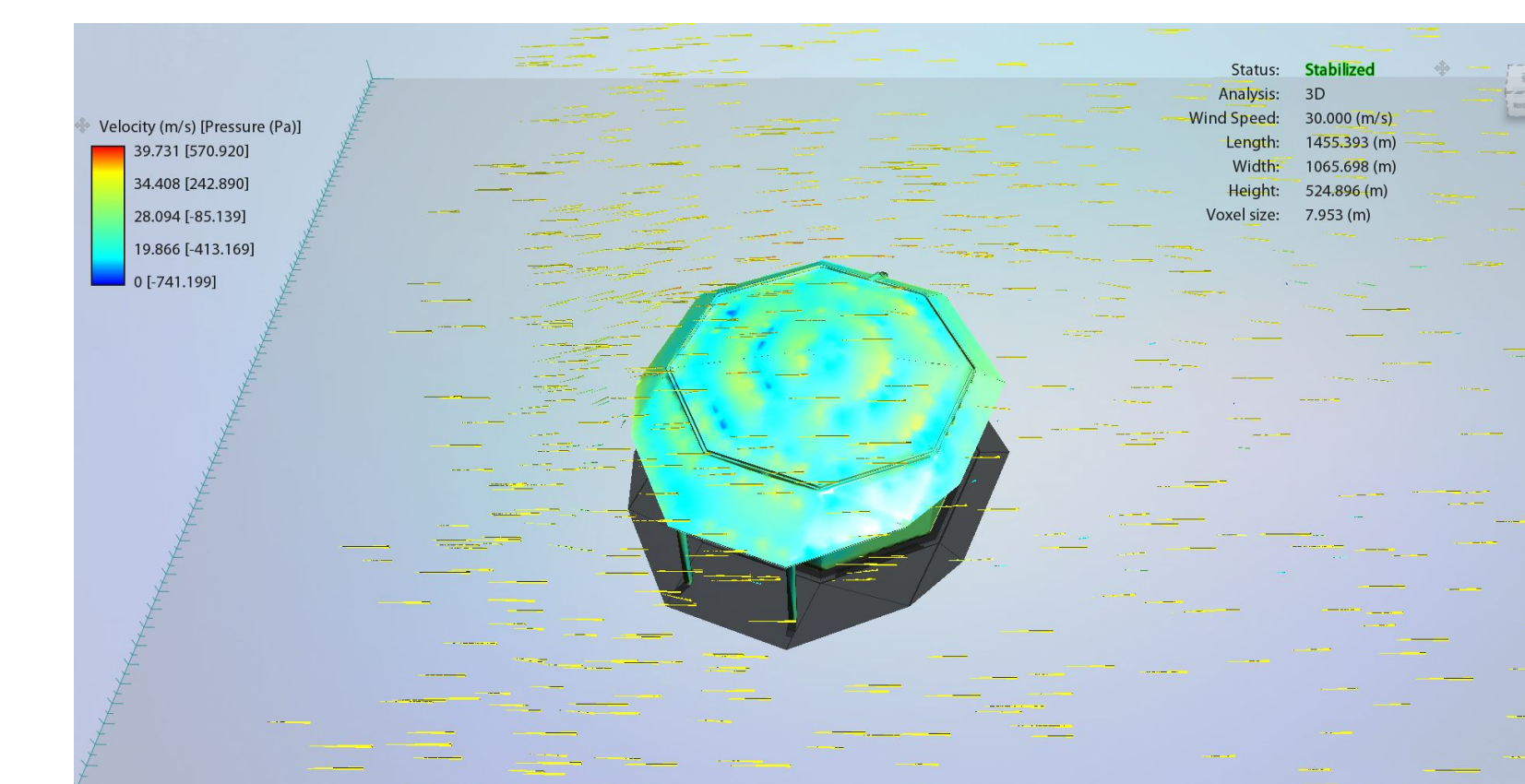


The Design allows families to expand and connect houses as they please.

Wind Testing



Side view of house in simulation



Top view of house in simulation

- The house was put into the simulation against 30 m/s and 40m/s winds and passed with a stabilized status.
- The octagonal shape and the low pitched roof allows the wind to easily flow around the house without putting to much pressure on any one point.

References

Hurricane Resistant Homes | Wind Resistant Homes | Custom Coastal Homes. (n.d.). Retrieved from <https://www.delteehomes.com/learn-more/hurricane-resistance/>
 Guatemala Housing Alliance (2017). What & Why We Build. Retrieved October 8, 2018, from <http://www.guatemalahousingalliance.org/what-why-we-build/>