Honeycomb House
By Two By Fluor

1 Modularization:
When discussing about our project, we focused on some key words when visualizing our house to share a common idea and ensure consistency throughout the design process.

This helped us embody ideas that were not tangible before.

2 Inspiration of Design
As we were discussing about the shape of our module, we started to look into the shapes occurring in nature. Natural shapes such as the Fibonacci spiral found in seashells and the hexagon displayed in honeycombs (from which we drew our inspiration) are in balance with patterns, and more importantly, are structurally sound. The requirements of our modular house called for such structural efficiency and flexibility in a shape.

- Our Solution: Regular Hexagon
  - Nature’s perfect shape
  - Efficient use of space
  - Ability to expand in six directions
  - Strongest shape

3 Our Site
MONTROSE

- Montrose, Houston serves as a residential area for thousands of people.
- Established in 1911
- Demographically diverse area

4 Building Sections: Plot
Our site in Montrose, Houston has no construction barriers. Our modular house is to be built towards the one of the two main streets, allowing easier access to both the main road and a smaller road.

With the total area of 43,733.99 ft², there will be plenty of excess space for more modules to be added in the future.

The unique hexagonal house will stand out shape wise, but blend in design wise due to the use of similar materials to the surrounding houses.

5 Building Sections: House
First, we first came up with a bubble diagram to represent our basic thoughts to focus on the key features that should be included in the house.

Then, we drew a few floor plans as different options and agreed on one.

Finally, we calculated the appropriate sizing of the house and figured out the dimensions.

6 Model
This is the first base of our modular house. The first base consists of three modular hexagons put together.

A platform will be built for further expansion, and will serve as a veranda. A space for a future staircase is reserved and used temporarily as storage space should the owner wish to expand upwards. The roof is flat and is minimally domed to prevent precipitation from collecting on top but still allowing additional modules to be “stacked” on top.

7 Expansion Modules
Additional modules are to be added on top of the already built veranda. This makes the construction process easier in fact that the foundation is already there.

Each hexagon is one module and residents will have infinite patterns as to how they want their new modules to be built. Additional platforms (verandas) could also be built.

Two of the six sides of the new module, the sides that will be adjacent to the already built module, will be empty walls with the backdoors (or additional doors made) will serve as the connection to the new module.
12 Sustainability & Security Tech.

Bioconcrete is a special concrete that utilizes the power of bacteria to produce self-regenerating concrete. Its use can be applied to the structure of the home to prevent the need of repairs.

Flexipave can be used to serve as an extra retention space. Flexipave is a super absorbent concrete that can be used on roadways.

Light Sensor Switches

Lutron sensors are capable of detecting the presence of people in order to understand when lighting is needed. Its use in the home is to be energy conservative by reducing the unnecessary use of lighting when people are not present in the room.

Made by Apple Nest labs provides home automation appliances that adapts to your daily life style and finds safer ways to help save energy and money. Using modern technology you can access your nest system from almost anywhere using wifi.

11 Safety

Safety is our No. 1 priority. We will never take precedence over the safety of our project sites. Our commitment to safety extends from our employees to our entire team of subcontractors, suppliers and vendors we work with. Everyone will work within our Safety Program including:

- Job Hazard Analysis
- Extensive Training Programs and Oversight
- Mandatory Personal Protective Equipment
- Daily Toolbox Talks
- Have a dedicated safety inspector.
- Regular safety training using a zero tolerance policy
- Having "close calls". This is where workmen report possible incidents that are in danger of occurring.
- For safety reasons we think that it would be best to create the additional rooms offsite in order to reduce the risk of hazards.

13 Cut Sheets

Specification:
- Floor size: 1995 sqft
- Single Family (can expand to multiple)

Features:
- Hardwood flooring
- Central HVAC
- Open parking space

Materials:
- Bio-concrete
- Flexi-pave
- Security Systems:
- Light sensor switches
- Smart home automation
- Solar panels

Construction:
- Exterior material:
- Stucco
- Foundation type:
- Stakes
- Stories starting at 1, can expand up to 3

17 Summary

Honeycomb House is an expandable modular house, each module in shape of regular hexagons, that accommodates the residents' needs.

In creating this project, our team overcame many obstacles regarding the location, shape of each module, the design, which materials to use, the layout, etc. These challenges prompted us to look at things that are not only around us such as our homes and buildings around us, but also to draw inspiration from the pre-perfected designs of nature.