

Durability and Resilience

Durability

Unlike most buildings within the built environment, our building envelope has almost unbroken thermal insulation. This tight envelope will allow the house to easily maintain its temperature throughout long cold winters and blazing-hot summers. With the thermal massing of the concrete, the structure is not only more robust than other buildings, but it also holds heat better than other buildings can. The Triple Dome Home will eventually be bermed, so the PVC membrane outside the building will be immune to solar radiation, and the structure will last for an incredibly long time. Regardless of what mother nature throws at the Triple Dome Home, it will outlast and perform better than other buildings.

Performance

Unfortunately, we were able to procure a SPAN smart panel, but we had some unforeseen issues with its installation; thus, we cannot place it in the house for this competition. However, we will be putting it within the house for future contests and to show off how it can easily integrate the home's ability to manage its electrical load efficiently. With that in mind, we would have had an easy and effective way to handle the electrical loads of the house.

Concrete domes are used all over the world, especially for community-safe houses where there are active hurricanes and tornadoes. The structural strength of concrete domes can withstand high winds, heavy snow loads, and even earthquakes. In addition, the shape of the dome allows for an even distribution of weight, giving our house a leg up on other homes.

Regulating the triple Dome Home temperature is much more efficient because of thermal massing and the high, almost unbroken thermal insulation. The spray insulation gives the Triple Dome Home excellent insulation from high heat and cold winters. Such a tight envelope will allow the dome to retain its conditioned air better than other structures.

Resource Management

Resource management for the Triple Dome Home is excellent on the energy side of things; however, we need to be connected to the grid because we do not have any batteries included onsite. Our Solar array will allow us to send more back to the grid than we take in. Even with our energy exports with the lack of batteries, we should install batteries to withstand blackouts from the grid. With the project's time constraints, we didn't get to have these onsite, but it would be a relatively simple upgrade to add onto the house in the future; Because of its portability, the house can take full advantage of the orientation and have a passive solar design that allows heat to come into the house in the winter. Placing the home near deciduous trees can shade those same windows during hot summer. Passive heating will enable the Dome Triple Home to use even less energy to maintain comfortable air quality. We need to be connected to the grid for our home. We do not have rainwater collection systems, but we have water-efficient fixtures and appliances that will naturally reduce the amount of water the occupants use during their time in the home. All of the appliances that we got that had Energy-efficient appliances were the ones our team selected for the house. Using these energy star appliances, we can easily find energy-efficient appliances that will perform similarly using less energy. One of the other ways we decided to manage our resources in this project was to install LED light fixtures to help lower the energy required for the house and its needs.

Resilience

The house is resilient in its ability to hold on to conditioned air more than other structures; however, it lacks any backup generators, battery connections, and water collection systems. These would be great things to install into the Triple Dome Home to allow it to maintain critical operations during disruptions. The solar panels that connect to the house will enable the owners to use the appliances in the house if the power goes down during the day. The energy efficiency from the insulation to the efficient windows and doors will allow the home to maintain its temperature. The electrical appliances and the light fixtures within the house take less energy to perform because they have been designed to do just that. Even during manmade sanctions on energy usage, the occupants of the Triple Dome Home should have no issues using all their appliances. Using innovative home technology, our house can monitor and control critical systems during a blackout.

Innovation

For occupant safety, a concrete dome, like the Triple Dome Home, will give the occupants a safer and stronger structure to take place in. The dome shape also eliminates a lot of damage that can be caused during the construction of the building, as very few things can cut you compared to traditional wood-framed houses. This reduction in edges is also apparent within the dome itself, granting a safer experience from within the dome for living standards.

With the HVAC system in place, we can pull clean air into the house and purify the air within it, but the home can also hold onto its temperature throughout the building. In addition, the concrete dome will minimize the risk of mold and mildew growth, which is common in traditional framed buildings. Using concrete in the structure, compared to wood, that could rot

will lead to the more outstanding air quality within the Triple Dome Home and be better for the overall health and safety of all the occupants within the building.

Because of its concrete instead of wood, the Triple Dome Home will resist termites, carpenter ants, beetles, and rodents. In addition, the strength of the concrete will make it harder for animals and bugs to get on the inside of the concrete to get to any of the wood in the walls and into the subfloor. Having a dome made out of concrete will make the home much more resistant to pests than a traditional home.