TRIPLE DOME HOME

For the past hundred years, we have had traditional homes that use unsustainable energy and have had a lack of consideration on the topic of residents' safety. Relying on this tradition can limit innovation. A solution to this is the Triple Dome Home - an attempt to reinvent the typical approach to home building in a safe and sustainable manner .

Prepared for Solar Decathlon Architectural Jury

https://tripledomehome.byu.edu/

Brigham Young University

INTRO.

In May 2006, a devastating earthquake struck the island of Java in Indonesia. The region most seriously affected by the earthquake is densely populated with people living in small villages separated by rice fields. Homes in one such village, Ngelepen [NEL-e-pen], fared worse than in neighboring villages because a catastrophic landslide completely swept the community off its foundations. But the Ngelepen villagers were more fortunate than many others in the region when the World Association of Non-Governmental Organizations (WANGO) and Emaar Properties in Dubai, United Arab Emirates, agreed on a plan to restore Ngelepen."

After completing an extensive feasibility study, one of Brigham Young University's professors, Dr. Andrew South, under the direction of the Domes for the World (DFTW) Foundation, was asked to rebuild the village on a tract of land set aside by the government especially for the rebuilding. By April 2007, the villagers were able to occupy the newly built, environmentally friendly concrete dome homes capable of withstanding the severe effects of many natural disasters. The new village had 71 concrete shell houses, arranged in groups of 12 around a shared building containing laundry, toilet, and shower facilities. A new well was dug for each of these clusters, and six independent septic systems were installed. Thin-shell concrete civic structures were also constructed—a mosque, primary school, playground, and medical clinic. The total development, which included roads and drainage as well, was funded by a $1 million grant from Emaar Properties.

SUSTAINABLE CHALLENGES.

Inspired by the sustainable, community centric dome homes built in Indonesia, the BYU Solar Decathlon Architecture team has attempted to apply the concept in a colloquial setting - The Utah Valley. Outlined hereafter are specific sustainable challenges that we face in our own home state.

AIR QUALITY

Utah's unique geography causes frequent air inversions that trap pollutants in the valleys where most of the population resides. At times, the mountains are barely visible through the smog. Gas furnaces and water heaters are the largest residential contributors to this crisis. Our highly efficient building envelope reduces the heating and cooling loads needed to condition the air in the home. All electric appliances are able to be powered by the on site solar system, cutting out all operational emissions.

WATER SCARCITY

At 184 gallons per capita, Utahns use more water than any other state except Idaho. While a large majority of that figure comes from agricultural usage, Utah still faces a pressing need to conserve water to be able to sustain its growing population. Our team took great care to find ways to lower the overall water usage of our structure. Low-flow fixtures, dual flush toilets, and a tankless water heater allow the homeowners to use the least amount of water possible while still keeping the house affordable.

HOUSING CRISIS

Utah has seen rapid population growth that has accelerated since the COVID-19 pandemic. Homes are not able to be built fast enough to meet the growing demand, and many options are not affordable for small families. The Triple Dome Home was designed to be an affordable option for a small family. With it's quick construction time (6 months), these homes can be built at apace able to meet the demands of a growing population.

ADDITIONAL CHALLENGES.

in addition to the US Department of Energy competition, this home will also be participating in the Utah Valley Parade of Homes tour and an additional Sustainable competition in Orange county. These events present their own challenges.

UTAH VALLEY PARADE OF HOMES

Throughout the month of June, the Triple Dome Home will have thousands of visitors touring. This is because the structure has been entered in Utah Valley's Parade of Homes (link). This is a large event where homebuilder across the valley showcase and sell large expensive mansions. The audience in Utah Valley is primarily traditional families, so we'd like to appeal to those families and make sustainable living attractive and affordable. The main issues we addressed deals with the nature of concrete domes feeling like the inside of caves. To combat these issues, we took inspiration from the warm color palettes currently trending by Utah designers like Studio McGee and The Fox Group. We chose Benjamin Moore's Ballet White to brighten and tame the cool, rough concrete walls. This light cream color reflects the natural light brought in from the windows with a slight warm hue.

ORANGE COUNTY SUSTAINABILITY COMPETITION

In October, we will be participating in a sustianbility competition in Orange County. This'll involve transportation the structure itself to California. This challenge led us to creating three domed modules that can separate and be individually loaded onto a truck bed. We were able to isolate all the rooms that use plumbing to ensure convenience when transporting the large structure this fall.

FLOORPLAN

AREA VIEW

Total SF - 760
36' x 26'

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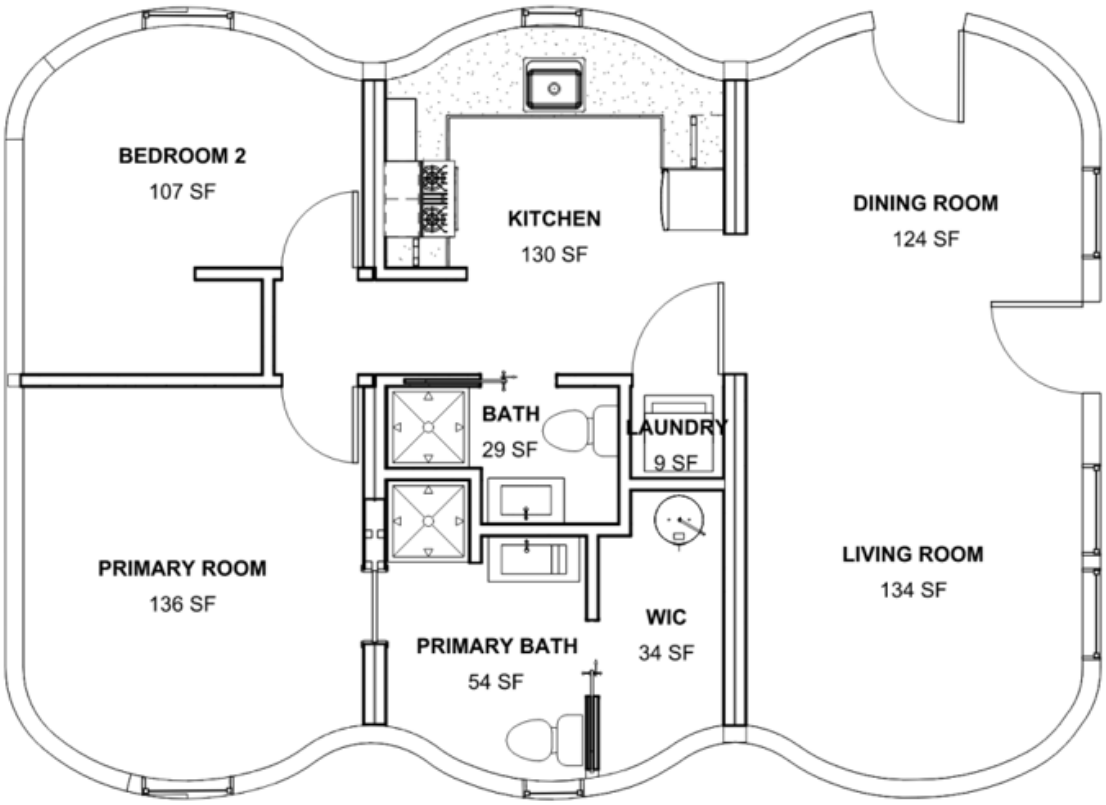
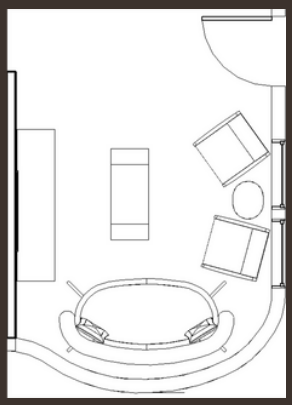


EXTERIOR AND LANDSCAPE

Once placed in its final location, retaining walls will be placed around the exterior openings and the house will be protected by an earth berm. Native plants will be able to grow on top of and around the structure, not requiring irrigation and naturally filtering the air and absorbing carbon.

The house is currently located in a vacant parking area on BYU campus. As it was unsustainable to import dirt and gravel to berm the house just to remove these features, the team chose to leave the exterior PVC membrane exposed. As previously stated, the home will need to split into three modules in order to be transported to California for the Orange County Sustainability Decathlon. Due to this constraint, the exterior and landscaping for the home will consist of road base to even out the grade and make the home easily accessible to visitors with potted native plants to aid in the visualization of the final landscaping. The carport/pergola to the north of the structure houses most of the PV solar system, with an additional structure and PV cells to the south that shade the large living room windows from the hot summer sun.

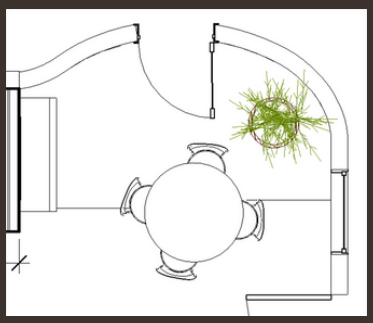
INTERIOR FF&E



LIVING ROOM

Features:

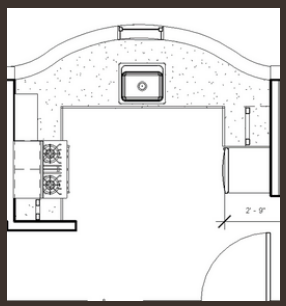
- Acoustical paneling behind TV and media console
- plenty of space to meet with visitors or watch TV
- A ceiling fan above



DINING ROOM

Features:

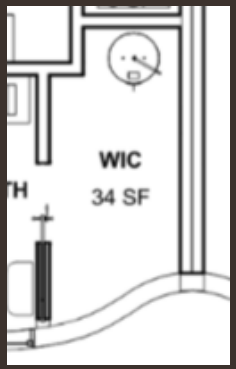
- Dining table
- orb chandelier
- console table and mirror



KITCHEN

Features:

- Rich, brown, European style cabinets
- countertop made from engineered quartz and 16% recycled materials

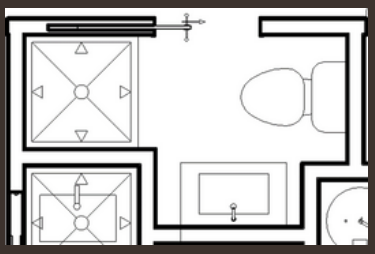


UTILITY CLOSET

Features:

- Storage Closet
- Dual washer and dryer

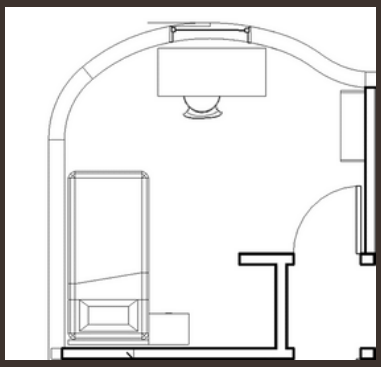
INTERIOR FF&E



GUEST BATHROOM

Features:

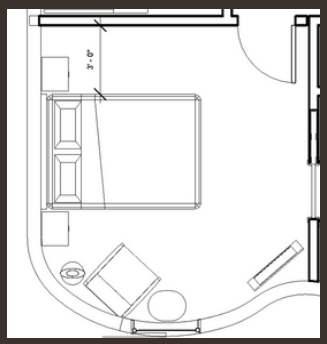
- Quaint Vanity
- Shower Stall
- Toilet



KID BEDROOM

Features:

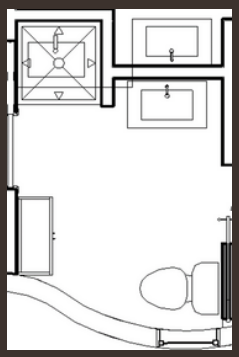
- Twin bed
- Pendant light next to bed
- Desk
- Bookcase



PRIMARY BEDROOM

Features:

- Ceiling Fan
- A nook to sit and read or get ready
- wall mirror
- Queen Bed



PRIMARY BATHROOM

Features:

- Plenty of space to get ready
- Toilet and vanity
- Storage case
- Spacious Closet for two