

Architecture for Extreme Weather Events- It's All About the Science (and the Math!)

The number of extreme weather events that are occurring is on the increase. Whether it is tornadoes, supercell storms or hurricanes, the damage they can do is costly in both dollars and human life. In the time period from 1980-1999, major floods have more than doubled and the number of severe storms has risen 40 percent. With this increase, new ways to build are being used as a way to protect people from the effects of these events.

Builders and architects have used their knowledge of physics and math to help them as they create extreme weather-resistant homes. Wind is one of the major forces that cause damage to buildings. Updrafts can peel a roof off of the base of the structure while horizontal winds can cause a home to slide off of its foundation. Because of these reasons, it is important for wind resistant buildings to have a continuous load path, or a design where each structural element is tied into the next. That way, the structure will respond to the high winds as a single unit, instead of individual, weaker ones.

Builders of this type of home also need to keep in mind both the shape and materials they incorporate into their designs. The roof is often one of the first things to be destroyed from high winds. To combat this, builders should consider a domed roof as it has no edges. This keeps the wind from catching it, creating lift, and raising it off the building. Hip roofs are also another design that perform well in high winds as they have little overhang, are lightweight and support the walls of the structure.

The shape of the home itself is important to consider. Square-shaped homes or circular ones do a better job in resisting the wind than rectangular or "L" shaped ones.

When designing a home to be able to withstand high winds, there are specific materials to keep in mind for the roof, walls and floors. All materials that are used need to be chosen to bear not only the weight of the roof, but also any force from high winds. The boards placed at the base of the roof need to be thicker than normal and the connectors that fasten the roof to the walls need to also be sturdier than those that are typically used. Hurricane straps could also be used to connect the roof to the walls. Reinforced concrete is one option in which to build the walls. Certain construction designs of this material can withstand winds up to 200 mph. Another material from which to build walls is multi-ply plywood. Finally, the building's foundation and floors need to be joined to each other and then to the other elements of the building.

There are specific engineering, design and materials that need to be taken into account when constructing a building that resists high winds. These structures can provide protection from extreme weather-related events while also providing for a beautiful living environment.

"[Extreme Weather Events Have Increased Significantly in the Last 20 Years.](#)" E360Digest, Yale School of the Environment. October 13, 2020.

"[Designing for Disaster Protection and Storm-Proof Homes.](#)" Fox Blocks. April 6, 2021.

"[Resilient Homes Part One: Making Homes Stronger to Stand Up to Hurricanes.](#)" Deltec Homes. April 6, 2021.

