Testing the Effectiveness of Wind-Resistant Construction Designs in Residential Settings

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Hurricanes and tornadoes can cause the same amount of damage as the GDP of entire countries. Fortunately, there are possible measures in place to prevent the damage caused by these storms. The problem with current construction methods is that they are not wind-resistant. Two possible solutions are an Insulated Concrete Form (ICF) wall, a form with metal pieces spanning the width of the wall and concrete poured in the middle, and a hip roof, a roof that has all sides of the roof sloped. It was predicted that when exposed to extreme winds, an ICF wall and hip roof would sustain less damage/be more aerodynamic than their control counterparts, which are a normal studded wall, and gable roof (roof that's 2 angled flat faces), respectively. After making a model of each construction method, the models were exposed to 60-65 mph winds with a force gauge attached to the roof models. Visual analysis was put into a numerical scale to grade each model, and the wall models had post-experiment "tests" to test durability. After the experiment, all of the models had a visual rating of "5 out of 5", except the studded wall model. The studded wall model had a visual rating of "3.66 out of 5". The studded wall model felt weak during the post-experiment "tests", while the ICF wall model was sturdy. The hip roof model averaged 193.3 grams of resistance, compared to 225 grams with the gable roof. Overall, the hypothesis was correct; the ICF and hip roof models sustained less damage and were more aerodynamic. This means that these construction techniques are more effective construction methods of wind-resistant buildings, and are viable to be implemented into extremely windy environments.

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