



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Samantha Kilmer	Project Number J0317
Project Title Shake It Off	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this project is to identify which building results in an architecturally earthquake-proof design, minimalizing shaking on each floor.</p> <p>Methods First, make 4 buildings using balsa wood and cardboard. One of them will have an 8 by 8 bottom, one will have a 6 by 6 bottom. The last two will have a four inch by four-inch piece of cardboard. Next, dissect an R/C car. Keep the direct current motor(D/C), the on/off switch, and battery pack. Solder the wires to the D/C motor, battery pack, and on/off switch. Glue the three components to one of the 2, 10 x 10 pieces of plywood. Glue five metal disks to each piece of wood mirror image of each other. Put 4 marbles and 1 spring in the metal disks. For the mass damper design, put a sphere like a chapstick container filled with brass hanging on a string in one building. For the roof-floor ropes, tie down another building to the 8 by 8 piece of cardboard. For the isolation device, glue four glass marbles to one end of the four pieces of balsa wood and glue four empty sphere like chapstick containers to the 6 by 6 piece of cardboard. For the control make no changes.</p> <p>Results The results found were the roof-floor ropes placed first with the all together sway being 42mm. The mass damper placed second with an all together sway being 50mm. The isolation device placed third with the all together sway being 69mm. The control placed last with the all together sway being 72mm.</p> <p>Conclusions The hypothesis was supported in that if the roof -to- floor ropes are properly secured, then the building should sway 5mm less than the mass damper, isolation device, and the control. The importance of this project was to show which structures are more stable than others when an earthquake occurs. I feel that this project would benefit Structural Engineers as well as people who live and work in these buildings.</p>	
Summary Statement Earthquake proof buildings are hard to design, and in this project, different designs were tested to see which structure would be the strongest against Earth's forces.	
Help Received Father, Joe Kilmer-engineer help; Mrs. Gastello, Science Teacher; Mom, board design and emotional support.	