Melany Arriola
Los Angeles, California

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Professional Engineers in California Government
P.O. Box 712352
Los Angeles, California 90071-7352

Dear Professional Engineers in California Government and John Vassiliades,

I would like to thank you for awarding me with the PECG "Marilyn Jorgensen Reece Award" ($1000). I greatly appreciate being recognized and am honored to be awarded. Marilyn Jorgensen Reece was an inspiring woman who pioneered the way for future female engineers. This award encourages me to pursue my goal of becoming a professional manufacturing engineer.

My name is Melany Arriola. I am currently twelve years old. I am a seventh grader at Magnolia Science Academy-6. Every day I make a big effort and push myself to do my best. This year I decided to pick a science project that really interests me. My project was called "Earthquake Resistant Structures." The purpose of this project was to test several different types of structures and techniques modern engineers use to strengthen building against earthquakes. I tested several methods including; bracing, counter weight, and base isolation. My hypothesis was that the building with the x-bracing was going to resist the earthquake the most because it has an x-shape that creates a triangular structure, which gives more support to the structure.

To start, I built fourteen different structures made out of wooden blocks, play-dough, foam, and coffee stirrers. Eight structures had different types of bracing. Each structure had X-bracing, K-bracing, or diagonal bracing. The bracing was made by the coffee stirrer. I had a total of two tests: one test with a base and one with a base. To test the structures I built an earthquake simulator. The simulator was made with to 4ft. by 4ft. plywood boards. In between they had four springs. A metal linkage and a metal wheel connected a drill to the two boards. The different strengths of the drill represented the magnitude of the earthquake. For each structure we recorded the amount of seconds it survived the shaking of the earthquake simulator. The other methods of strengthening I tested were counter weight and base isolation. For counter weight I used a small plastic cup filled with several heavy metal marbles. For the base isolation I used plastic cylinders. I also recorded the time for these structures. At the end, I also built an additional structure with K-bracing and base isolation.

After performing the experiment I observed several effects. I observed that the K-bracing survived longer than the X-bracing. I learned that it survived longer because the bracing had many triangles and that triangles are much more resistant and stronger than squares. I also observed that the base isolator survived even longer than the structure with K-bracing. The base isolator survived for 16 seconds, which were11 more seconds than the K-bracing. The base isolation helps the building move with the shaking of the earthquake. Consequently, the structure with the combination of K-bracing and base isolation, survived even longer. It survived for 19

seconds. In conclusion bracing and base isolation greatly reduce the risk of a building collapsing during an earthquake. Therefore, engineers in places like California where earthquakes occur should try to use these techniques in future buildings. The only problem might be the cost to install the bracing and base isolation.

Once again thank you for granting me this award.

Sincerely,

Melany Arriola