



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> <b>Zachary A. Selig</b>	<b>Project Number</b> <b>J1818</b>
<b>Project Title</b> <b>Earthquake-Resistant Building Foundations</b>	
<b>Objectives/Goals</b> What kind of earthquake resistant foundation (rollers, ball bearings, or isolators) most protects buildings from earthquakes? Based on the fact that the isolators are more flexible than the rollers and the ball-bearings, I believe that in my experiment the metal and rubber washers, which function like isolators, will provide the most stability and the least displacement of the water, representing the amount of structural damage.	
<b>Abstract</b>	
<b>Methods/Materials</b> <b>MATERIALS</b> Simulated Building, Earthquake rig, Calculator, Scissors, Flashlight, Watch, Tape measure, Camera, Plastic 2-cup capacity measuring cup, Pitcher, Water, Paper and pencil <b>METHODS</b> >Build earthquake rig >Set up experiment site by laying down towel and clamping earthquake machine to the table so it cannot move. >Determine performance of earthquake rig >Run control (Foundation attached to rig table) experiment to establish baseline >Perform steps for other foundation types. >Make tables and graphs of your results and finish notebook.	
<b>Results</b> I noticed that those foundations that moved on ball bearings and rollers lost less water than those that did not. The reason the bearings resulted in the least amount of damage is because it allowed for the greatest freedom of movement. It could move freely in any horizontal direction along the top of the rig table. The bearings also had the least amount of friction between the rig table and the frame. The rollers could only move freely in one direction, and there was more friction between the rollers, the rig table, and the frame. Finally, the isolators transferred more of the vibration to the frame due to less flexibility of movement.	
<b>Conclusions/Discussion</b> I actually found that the ball bearings (marbles) provided the best foundation support because it caused the least amount of water loss. My data showed that the fixed foundation (control) displaced about ½ cup of water while the marbles prevented any water loss. The reason the marbles were the most successful at preventing any water displacement was that they provided the most freedom of movement, least friction, in all directions relative to the rig table.	
<b>Summary Statement</b> Using a variety of representative foundations, I looked how each performed at protecting the building under standardized earthquake simulations.	
<b>Help Received</b> Dad helped conduct the experiment, and Mom helped with typing and layout.	