



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Joseph P. Monaghan	Project Number J0709
Project Title The Dirt on Soil: Does Soil Type Affect Building Stability During an Earthquake?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project is about which type of soil would be the best to build a building on and would withstand shaking in an earthquake. My hypothesis was that if clay soil was better to build a building upon than bedrock, soil, gravel or sand, then there would be less sway of the building.</p> <p>Methods/Materials A shake table was used from a previous science fair project. The shake table was made of wood, pvc pipe, "v" shaped wire and a drill to power the shaking. A brick with an arrow on top was videotaped on a shake table containing nine different types of soils (bedrock, soil, sand, clay, gravel, and mixtures). The amount of sway as well as the time it took for the building to fall for each ground material tested was recorded. Soils were tested ten times each for 20 seconds. Videotape was viewed in slow motion to record movement of the test building seen on a 2cm square graph displayed behind the shake table.</p> <p>Results Gravel had the most sway with an average of 6.19 cm. Mixtures of gravel had a slightly lower sway with an average between 4.53 and 5.26 cm. However, bedrock was the best overall in standing up with an average of 18.3 seconds. Wet sand had the lowest amount of time for the building to stand with an average of 1.4 seconds and liquefaction occurred in all of the ten trials of wet sand.</p> <p>Conclusions/Discussion Gravel tended to settle which caused more sway. Any type of soil that is loose causes buildings to become unstable. The amount of sway in the test results were very close and may have been improved with a different type of test building. Bedrock was the only ground material to have the test building last 20 seconds without falling. Soft soils caused the test structure to settle, making the building fall. Bedrock would be the best to build a building upon or compacted soils. Soils should be tested for type and stability before a building is built upon especially in an earthquake prone area.</p>	
Summary Statement This project tests how soil types affect building stability during an earthquake by using a shake table and a vertical brick to record building sway and building stability on various types of soils.	
Help Received Mother helped with videotaping trials and assembling display board. Father assisted with editing.	