



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Madeline A. Cushing	Project Number S0810
Project Title The Effects of Water on a House's Foundation on Three Different Soil Bases	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to determine which of the three soil bases, sand, silt, and clay, lends itself the greatest stability with vast water intrusion and lack of proper drainage.</p> <p>Methods/Materials Three plexi-glass boxes of the same size and volume were purchased. The same volume of sand, silt, and clay was added to the three different boxes, each box with a different type of soil. Each soil is compacted with a three pound weight until dense as possible. A ceramic tile and constructed house was added to each compacted soil within the boxes. Each box goes through the simulation of a heavy rain of 1.89 L water added and the volume, mass, tilt, fischering/cracking or air pocketing, grade/slope, and pooling are measured after 20, 40, and 60 minutes. Another 1.89 L of water is added and the same measurements are recorded again after 20, 40, and 60 minutes.</p> <p>Results No soil is optimal without proper drainage, but the box with the sand soil base lent itself the greatest stability with the vast water intrusion and lack of proper drainage. The sand soil base caused the least amount of movement and supported the structure of the foundation the best out of the three soils. The sand soil base absorbed water without eroding, collapsing, or air pocketing. In addition, the sand soil base remained the most level of the three soils preventing tilt or grade of the foundation.</p> <p>Conclusions/Discussion In my hypothesis I believed that the clay soil bases lended the most stability because of its dense structure and limited air spaces causing the least amount of erosion and collapsing of the soil. But in actuality, after experimenting, the clay eroded the most and expanded and collapsed after the addition of water. But the clay was not the worst of the three soils. Silt, by far, had the most erosion, collapsing and washing away the soil causing many problems to the house and its foundation. This allowed the conclusion to be reached stating that the sand was the most stable of the three soils and protected and stabilized the houses foundation the best.</p>	
Summary Statement My project is about which of the three main soil bases is the safest and best to build on when there is excess rain or water intrusion.	
Help Received Mother helped buy supplies; mother helped add water; mother helped dig up dirt.	