



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) Michelle Boguslavsky	Project Number S0303
Project Title Liquefaction Affects the Settlements of the Lego Building Depending on the Type of Soil Mixture	
Abstract Objectives/Goals Settlement of the Lego assembly building due to the Liquefaction phenomenon was investigated for the 3-different types of soil mixtures. Soil liquefaction is soil failure due to the varies static or cyclic load in closed proximity of the shallow ground water table. The purpose of this study was to identify what type of soil more susceptible to liquefaction. Methods/Materials Three types of soil were used in the research: clay; loamy /fill and sandy soil. Experimental shaking table was constructed out of plywood and wooden stick. To create violent shaking - electrical sander was attached to the table. Lego blocks were used to assembly structure to imitate building, supported by the soil. Three containers filled with 2 kilograms of different type of soil and added 0.7 liters of water were used in the 30 experimental trials. 10 Trails for each type of soil. Each soil container with Lego structure on top was placed on the shaking table and shake for 60 second, then settlements of the Lego assembly measured in millimeters was recorded for each trial. Results Sandy soil was fully liquified and Lego structure settlement data was about twice greater than in partially liquified loam /fill type of soil. The percentage of data deviation was very small for both type of sandy and loamy / fill soil, 5% and 8% respectively. Experimental study for the clay type of soil was shown significant percent of data deviation spread up to 57.8%. However, clay soil was never liquified during the shaking and apparently was not properly compacted prior to the experiment. Conclusions/Discussion Experimental data shown that clay soil has very low to none abilities to liquify. The loamy /fill and Sandy soil can be liquified due to liquefaction phenomenon. Both of those soils have low internal frictions between the soil particles and a lot of air voids, which could be filled with water and liquify the soil.	
Summary Statement I found that sandy soil was the most affected by liquefaction which resulted in my Lego building sinking with greater depths, the Loamy / fill soil was partially liquified and the clay soil did not liquefy at all.	
Help Received I designed the shaking table by myself while my father suprvised when I started to cut plywood and screw the table legs.	