



**Understanding Earthquake Impact on Building by Weight
2025 NSF NHERI Large High Performance Outdoor Shake Table at the
University of California, San Diego
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- **Summary-**
Putting towers of different weights on a homemade shake table to see how the weight of the tower affects how well it withstands shaking.
- **Engineering Connection-**
Impact of materials on earthquake design.
- **Audience-**
3rd-5th grades
- **Lesson Objectives-**
 - Students will design model buildings of different weights.
 - Students will test them on a homemade shake table.
 - Students will learn that heavier buildings are more impacted by earthquake motion.
- **Educational Standards-**
3-ESS3-1 Earth and Human Activity (Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard)

3-5-ETS1-1 Engineering Design (Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.)
- **Material List-**
Big box, marbles, smaller box, food cans, cardboard, popsicle sticks, hot glue
- **Introduction-**
We want students to learn about the importance of structural materials in an earthquake

- **Procedure-**
 - Background knowledge:
 - What are earthquakes?
 - Before the activity:
 - Set up shake table by putting marbles in the big box and putting the small box on the marbles.
 - Students write a prediction of how a building's weight affects the seismic forces on it.
 - During the activity:
 - Students can design buildings out of the popsicle sticks, cardboard, and cans.
 - Buildings will be weighed and then shaken at approximately the same acceleration until failure.
 - After the activity:
 - Students share why they think buildings performed the way they did

- **Assessment-**
 - How will you know that students have mastered the objectives?
 - Students will write a reflection about how their building did relative to other buildings of different weights

- **Wrap-up-**
 - How will you wrap-up the learning/activity to ensure retention?
 - Teacher will explain how this activity connects to real life: which materials are commonly used in construction (wood, concrete, steel), and how heavy the materials are.
 - Students then can rank how well each might perform in an earthquake.