

Whole Lotta' Shakin'

COVER LETTER FOR REQUEST FOR BID PROPOSALS

To All Interested Engineering Companies:

In order to make the buildings in our community safer during a possible earthquake, Town Council is considering legislation requiring all contractors to meet new building codes. Though it has been a number of years since our town has been affected by an earthquake, we understand that scientists cannot predict when or where an earthquake will occur.

Collapsing buildings can result in many deaths during an earthquake. The new codes will incorporate innovative and sound engineering design principles. Interested engineering firms are asked to submit design proposals for earthquake-proof buildings. Designs will be reviewed and tested by a committee comprised of earthquake experts. The most stable designs will be awarded contracts.

To become part of the bidding process, submit the following information:

1. A physical model of your design, measuring no more than 20 cm × 20 cm, utilizing materials of your choice.
2. A written plan describing the type of materials used, special features incorporated into the design, and a discussion of the reasons why your team selected these materials and features.

OBJECTIVES

Select materials to create a building that will remain stable while shaken.

Design and build a model of an earthquake-proof building.

Evaluate the stability of the model when subjected to vibration.

Compare the effectiveness of a variety of designs and materials used in the construction of earthquake-proof model buildings.

MATERIALS

- building materials (may include clay, sugar cubes, stones, paper, toothpicks, craft sticks, twigs, aluminum foil, metal rods, or other materials) and tape, glue, etc.
- large shallow pan of set gelatin (two pans total; one to be used each day of the experiment)

Procedure

1. Develop a team approach to the project by engaging in a discussion about possible building designs. Review the available materials that can be used in the construction of the earthquake-proof model. Use sketches to assist in the design process, and experiment with various materials before making a final decision.
2. Create the model. It must be no larger than 20 cm × 20 cm. Prepare a brief written description of the design. It should include a sketch, a list of materials, and a discussion of the reasons supporting the choices made by your group.

Whole Lotta' Shakin' *continued*

- 3.** All teams will test the effectiveness of their models by placing them in a pan of gelatin prepared by your teacher. When the pan is shaken, make observations about the effectiveness of different designs and materials.

Analysis

- 1. Describing Events** What factors did your group consider when creating a design and selecting materials for your model? How difficult was it to reach agreement within your team about the best approach to take?

- 2. Explaining Events** Explain what happened when your model was shaken in the pan of gelatin. Be specific.

- 3. Analyzing Data** Compare the effectiveness of the structures tested. What materials seemed to make a structure most stable? What design strategies seemed to help a structure remain standing while the pan was shaken?

Conclusions

- 4. Drawing Conclusions** Based on your observations, is it possible to construct a building that is totally earthquake-proof? Defend your answer.

Extension

- 1. Building Models** Based on class observations, brainstorm with your class to create a theoretical model that incorporates the most effective design strategies and materials demonstrated. Build the model and compare its ability to withstand stress to that of the original models.