

Soil Lessons



Materials Needed

- 4 quarts of topsoil
- 4 quarts of sand
- 4 quarts of dry peat
- 3 liters of water
- 1 liter Measuring cup or graduated cylinder
- 3 plastic shoe-box-sized containers (about 6 quarts)
- A larger container that the plastic containers can slide around in.
- Enough Legos to make an 8cm x 10cm house.
- Ruler
- Pen

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Liquefaction in different soil types

Question:

How will the type of soil (peat, sand, or topsoil) affect how much a house will sink during a liquefaction event?

Background information from USGS:

What Is Liquefaction?

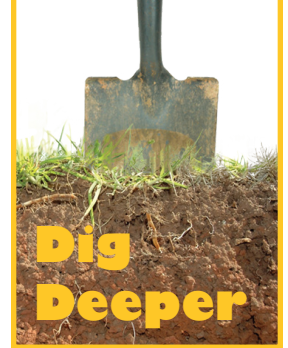
Loose sand and silt that is saturated with water can behave like a liquid when shaken by an earthquake.

How does it work:

Earthquake waves cause water pressures to increase in the sediment and the sand grains to lose contact with each other, leading the sediment to lose strength and behave like a liquid. The soil can lose its ability to support structures, flow down even very gentle slopes, and erupt to the ground surface to form sand boils. Many of these phenomena are accompanied by settlement of the ground surface – usually in uneven patterns that damage buildings, roads and pipelines.

Procedure:

1. Gather all the supplies.
2. Fill each of the smaller plastic containers about 2/3 full - one with sand, one with topsoil, one with peat.
3. Use the Legos to build a 8cm x 10cm Lego house.
4. Add 1 L of water to the topsoil.
5. Place the model house on top of the soil.
6. Place the soil container in the middle of the larger container.
7. Use the ruler to measure the house's height, then place the containers on a flat surface. With a partner, roughly shake the outside container for 40 seconds. Do not lift the containers off the surface.
8. Re-measure the house's height. Record in the table below.
9. Remove the house from the topsoil.
10. Even out the soil surface and repeat steps 5 - 9 twice.
11. Repeat steps 4-10 with the sand and peat. Each soil medium gets 3 repetitions. (continued)



Liquefaction in different soil types

Depth of house sink (cm) by soil type			
	Peat	Sand	Topsoil
Trial 1			
Trial 2			
Trial 3			
Mean measurement			
Notes on house shift (front, back, side, etc.)			

What patterns did you observe?

Which soil provided best stability?

Why do you think that is so?

**Take care to protect the surface of the bench, desk, floor, or whatever surface is being used. Some sand grains may get between the shaken container and the floor or surface you move it across and may cause scratches.

