

Ground Shaking and Damage at Your House

(Internet/Acrobat Reader, Word Processor)

In this activity, you will access the ground shaking hazard and potential damage to your home from an earthquake of a certain magnitude.

Finding Peak Ground Acceleration at Your Location

Earthquakes cause the ground surface to move in many different directions. The change of velocity in the ground surface during shaking is called **acceleration**. Buildings (and people) experience acceleration as a force pushing on them. High accelerations are more damaging to buildings than low accelerations and high accelerations lead to higher intensity of damage at a given location. As a result, engineers are very interested in determining the **peak ground acceleration** (PGA) probable in a location, so they can design structures to withstand the potential shaking. Acceleration values are reported in %g of gravity.

1. To find the Peak Ground Acceleration, please visit the following website:

USGS, 1996, *Probabilistic Hazard Lookup by Zip Code*.

Online: <http://eqint.cr.usgs.gov/eq/html/zipcode.html>

2. Enter the zip code for your home address and press submit. You will receive a report similar to the example below. The value you are interested in is the first number in the left-hand column.

The input zip-code is 98198.

```
ZIP CODE                98198
LOCATION                 47.4003 Lat. -122.3091 Long.
DISTANCE TO NEAREST GRID POINT 0.6837 kms
NEAREST GRID POINT     47.4 Lat. -122.3 Long.
Probabilistic ground motion values, in %g, at the Nearest Grid
```

point are:

	10%PE in 50 yr	5%PE in 50 yr	2%PE in 50 yr
PGA	31.293449	40.851151	55.394939
0.2 sec SA	66.365044	104.852898	127.370201
0.3 sec SA	59.725670	91.768822	122.026100
1.0 sec SA	20.979300	29.720091	43.530849

3. What is your zip code? _____

Ground Shaking and Damage at Your House

(Internet/Acrobat Reader, Word Processor)

What is the PGA value under 10% PE in 50 year? _____ % g

What does this mean? It means that there is a 10% probability that the Peak Ground Acceleration will exceed this value in the next 50 years!

Comparing PGA to the Mercalli Intensity Scale

Let's find out what these acceleration values mean to your home in terms of the intensity of shaking and potential damage. Start by finding the Mercalli Scale Intensity Equivalent for the PGA determined above. You can look at the Mercalli Scale at this website:

Bolt, Bruce, 1993, Abridged Modified Mercalli Intensity Scale. Online at:

http://www.eas.slu.edu/Earthquake_Center/mercalli.html

(Note: There is an underscore in this URL: Earthquake_Center).

Notice that the acceleration values are given in g and not in %g. You will have to move the decimal point of the acceleration value above two spaces to the right. Example:

31% g = 0.31 g.

4. What Modified Mercalli Scale Intensity does the PGA determined in #3 equate to:

5. Write the Mercalli Scale description of this shaking.

Ground Shaking and Damage at Your House

(Internet/Acrobat Reader, Word Processor)

Potential Damage to Your Home

Maybe you can find out more about the possible damage to your home by looking for information specific to the type of building you live in. The following website provides information on housing types and potential structure damage based on type.

ABAG (Association of Bay Area Governments), 2003, Impacts of California Earthquakes on Buildings from Shaken Awake. Available Online: [<http://www.abag.org/bayarea/eqmaps/shelpop/bldg.html>]

Read the classification
Click on the type of construction that best describes your home.
Read the description provided.

6. Building type of your home: _____
7. Based on the construction of your home, what structural damage is likely to occur to your home as a result of severe earthquake shaking? Does your home contain any of the weaknesses mentioned in the description? If so, which?
8. Examine the graph: Percent Uninhabitable By Intensity Level. Estimate the percentage of homes (of your building type) that are likely to be uninhabitable after an earthquake of the intensity you found in question 4:

Synthesizing Ground Shaking Information

9. In your Earthquake Hazard and Risk Report, you will be asked to discuss the hazard and risk to you of ground shaking at your home. You now have all the scientific data that you need to make this evaluation. Using the information above, type a paragraph or two that synthesizes the information for your report. You will need to use a separate piece of paper. Be sure to include citations to the sources of your information.