

NATURAL FREQUENCY AND BUILDING RESPONSE

structural engineers are keeping us safe

What is ground shaking?

- We know that seismic waves are produced during earthquakes and cause shaking
- But how does this ground shaking really occur?
- Let's take a look....

Frequency

- Frequency is how often a vibration occurs
- A hertz is the measure of frequency and is one cycle per second
- Frequency = # of cycles per second



**Write this
down!**

Period of Vibration

- Period is the time it takes for one full cycle
- This means that period (T) = 1 / Frequency
- Period (T) = $\frac{1}{\text{Frequency}}$

**Write this
down!**



What affects frequency?

- Let's define natural frequency:

Natural frequency is the frequency at which a system naturally vibrates once it has been set into motion.

- It depends on the mass and stiffness of the system
- Lets use the spring to help us...

What does all this mean...



...for earthquakes and windstorms?

- **Resonance** occurs when the forced vibration on an object matches the natural frequency of the object...
- Lets experiment and see what happens...