Professional Engineers
Ontario
Scarborough Chapter

Mar 25, 2025

Dear Principal/Teachers:

20th Annual Bridge Building Competition (BBC) and 7th Annual Seismic Resistance Structure Contest (SRSC) – May 3rd, 2025

The Scarborough Chapter of Professional Engineers Ontario is excited to conduct the Annual Bridge Building and Seismic Resistance Structure contests on **Saturday, May 3rd, 2025 at Scarborough Civic Center Rotunda (Council Chambers) 150 Borough Drive, Scarborough. ON**

These competitions will be open to students of **grades 3 to 8** who study in a Scarborough School or live in Scarborough**.** Each team can have a maximum of 3 members (min 2 members per team). The winning teams will receive exciting prizes.

Children, as teams of two to three members, apply the basic principles of engineering to designing and constructing bridges/structures from popsicle sticks and balsawood sticks. Their understanding about the principles of physics and engineering will be judged by a group of professional engineers who are volunteers of the Scarborough chapter. The bridges/structures, made by the teams, will be tested with a special machine, to evaluate the performance, in front of the teams, teachers, parents, and MPP's from some of the ridings in Scarborough.

Registration will be on "first come first served" basis. We will allow the first 50 teams to register, and the rest will be kept on the waiting list. To avoid disappointment, please register your students early. Registrations by Eventbrite will be accepted until **Saturday April 19th, 2025.**

For more information on this exciting event, please visit our website and follow the links at: **https://scarborough.peo.on.ca/index.html**

If you have any questions, kindly contact the ***BBC & SRSC Organizing Committee Project Manager***, René Siguenza, at **bridge@peoscarborough.ca.**

Sincerely yours,

Dr. Jega Jeganathan PhD, P. Eng., FEC
Chair, Scarborough Chapter of Professional Engineers Ontario

Professional Engineers Ontario

Scarborough Chapter

SEISMIC RESISTANCE STRUCTURE

2025 CONTEST

When?

Saturday,
May 3rd, 2025
9:00am – 3:30pm

Where?

Scarborough Civic Centre
150 Borough Dr.

Who?

Grade 7 and 8 students from Scarborough who will build structures with BALSAWOOD STICKS and who would dream one day to build a structure similar to the "CN Tower"

Why?

PRIZES! PRIZES!! PRIZES!!!

1st, 2nd, and 3rd place prizes for each category
18 prizes (with minimum 2 students to maximum three students per team) valued over $500

Testing with a Shaking Table
Judges' Score: Structural Design and Interview by Judges

Each contestant will receive a *Certificate of Participation!*

For more information, and registration please visit our website at:
https://scarborough.peo.on.ca

REGISTRATION DEADLINE: April 19, 2025, 11:59 pm

Follow us : @PEOScarborough @PEOSC @PEO_SCARBOROUGH

SRSC Specifications and Rules

1. Materials

The seismic resistance structure must be constructed only of wooden sticks and glue. Foam board and construction paper are only used for the slab.

a. Wood stick (less than 5x5 mm in thickness). Colored sticks are acceptable. ***Do not use bamboo sticks***

b. White school glue

c. Foam board (less than 7 mm thick)

d. Construction paper

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2. Restriction of dimensions The overall sizes of bottom of structure are not more than 300 mm x 300 mm. The size of top of the structure must be between 100 mm x 100 mm and 300 mm x 300 mm

3. Weight Restriction The total weight of structure must not exceed **200 grams**.

4. Minimum height The structure must be more than **700 mm high**.

5. Construction method The structure can be constructed with single sticks. 2 or more sticks glue together is not permitted. Attach a label to the structure, indicating the name of structure and names of team members.

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6. Judge's criteria Each structure is judged based on the following attributes:

a. Construction technology

b. Construction quality

c. Technical presentation and description of the structure design and construction

d. Aesthetics

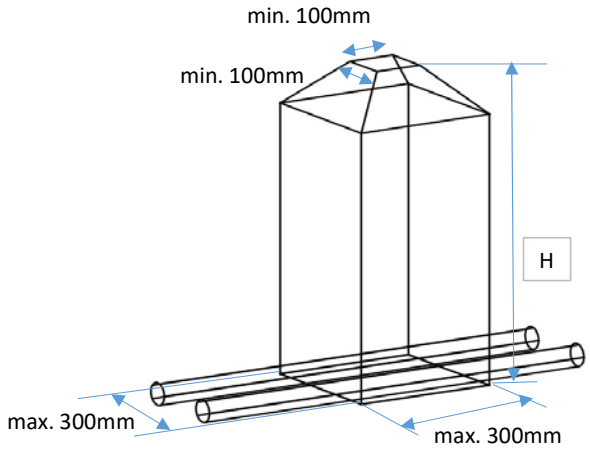
e. Creativity

A sample SRSC Structure is shown below:

Checklist for SRSC 2025

No.	Description	Max.	Min.	Note	Checked
1	Material: wood stick	5x5mm		No Bamboo	
2	White school glue				
3	Foam board	7mm thk			
4	Construction paper				
5	Dimensions: Bottom	300x300mm			
6	Top dimensions		100x100mm	Provide Flat top for weight testing	
7	Weight:	200 gr			
8	Height		700mm		
9	Allow access of 2x diameter 1" pipes to pass through bottom structure (see. Illustration)			these pipes used to secure the structure to shaking table	
10	2 or more sticks gule together			Not allowed	

Max. Score 100 points, each item not complied will be penalized



Seismic Resistance Structure Contest (SRSC)

Presented by: Professional Engineers Ontario Scarborough Chapter

Professional Engineers Ontario

Scarborough Chapter

www.scarborough.peo.on.ca

Welcome!

We are pleased to introduce a new competition, Seismic Resistance Structure Contest (SRSC), as part of the National Engineering Month (NEM) Event in 2017.

This contest is for Grade 7 and 8 students from Scarborough Schools who will build building structures with wood sticks (do not use bamboo sticks) prior to the event (at home/school). The structures are evaluated by judges and will be tested.

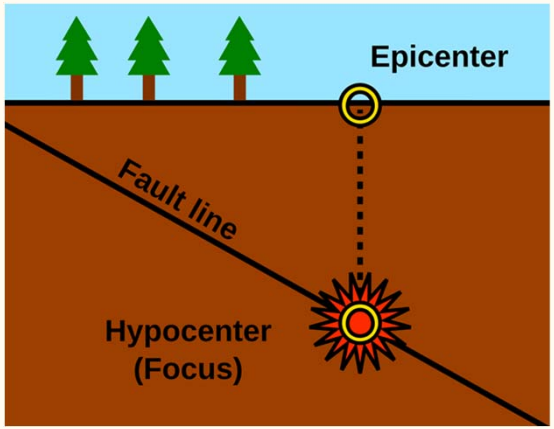
Follow PEO Scarborough on twitter: @PEOScarborough. TAG us with your PICTURES!

Seismic?

Pertaining to, of the nature of, or caused by an **earthquake** or vibration of the earth, whether due to natural or artificial causes.

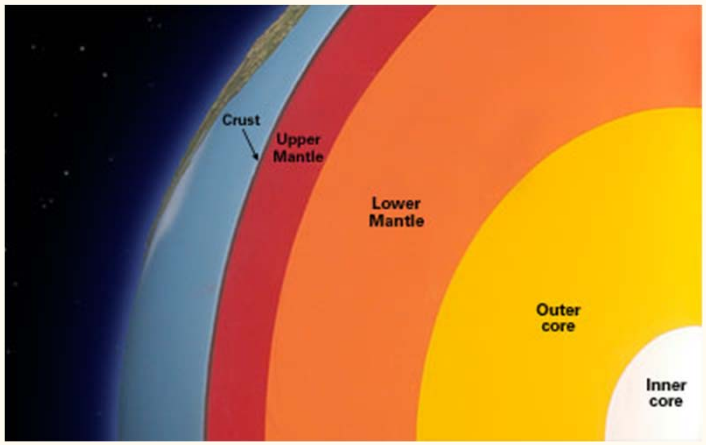
Earthquake?

An earthquake occurs when you get two tectonic plates (blocks of the earth) suddenly slip past one another. This sudden release of energy causes the seismic waves that make the ground shake. The surface where they slip is called the fault or fault plane. The location below the earth's surface where the earthquake starts is called the hypocenter, and the location directly above it on the surface of the earth is called the epicenter.

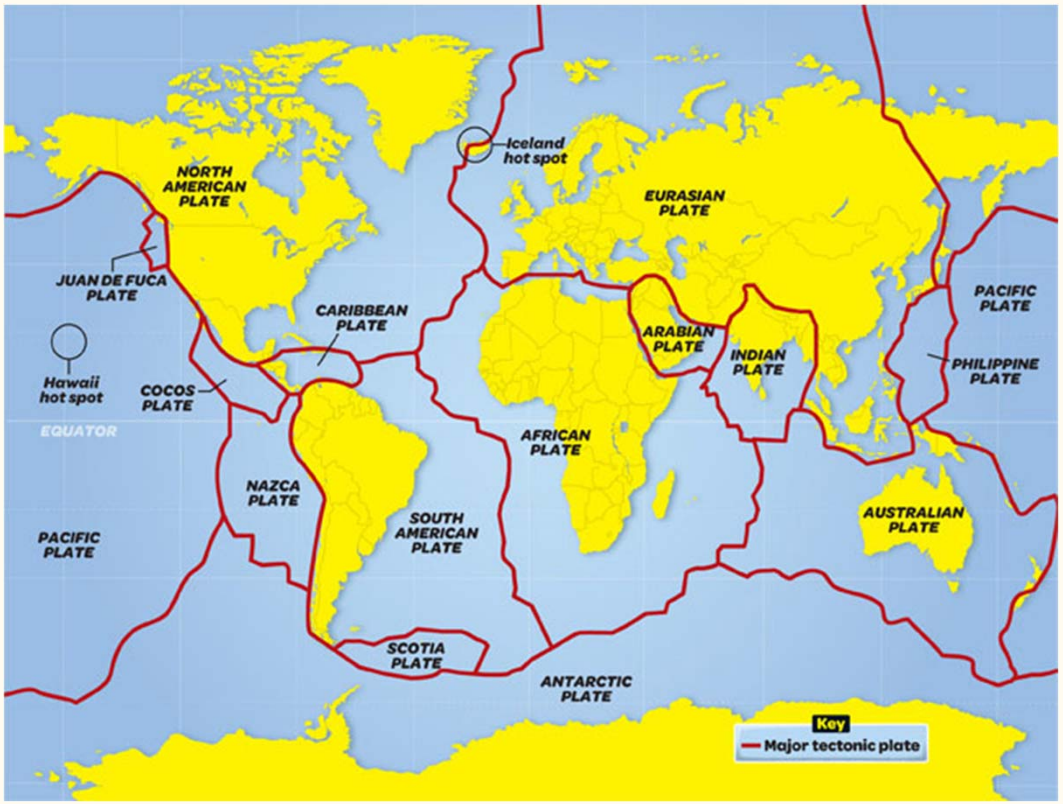


What Causes an Earthquake?

The earth has four major layers: the inner core, outer core, mantle and crust. The crust makes up the surface which is not all in one piece. We call these pieces tectonic plates. These plates are constantly moving around, sliding past one another and bumping into each other. Most of the earthquakes around the world occur at the edges of these plate boundaries.



Tectonic Plates



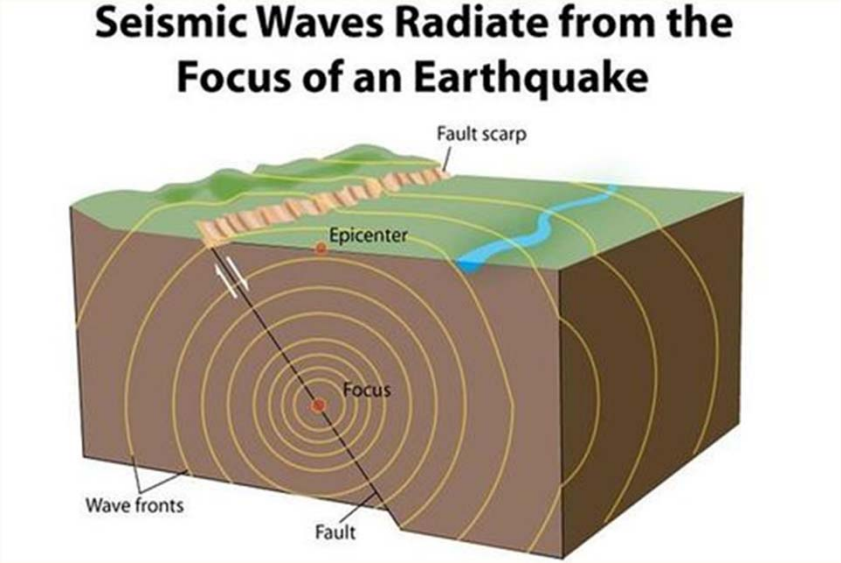
Earth Shake?

When the edges of the tectonic plates move against each other they stick and unstick. This causes all the energy stored up to be released. The energy radiates outwards from the fault line in all direction in the form of seismic waves like ripples on a pond. The seismic waves shake the earth as they move through it, and when the waves reach the earth’s surface, they shake the ground and anything on it, like our houses and us!

Waves?

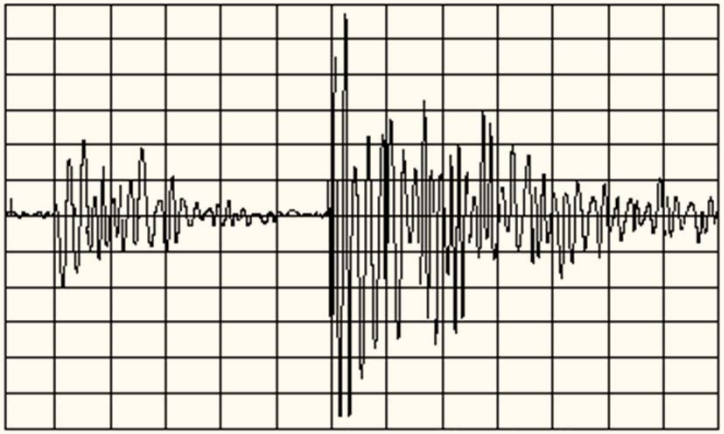
Seismic waves are the waves of energy caused by the sudden breaking of rock within the earth or an explosion. They are the energy that travels through the earth and is recorded on seismographs.

There are several different kinds of seismic waves, and they all move in different ways. The two main types of waves are body waves and surface waves. Body waves can travel through the earth's inner layers, but surface waves can only move along the surface of the planet like ripples on water. Earthquakes radiate seismic energy as both body and surface waves.

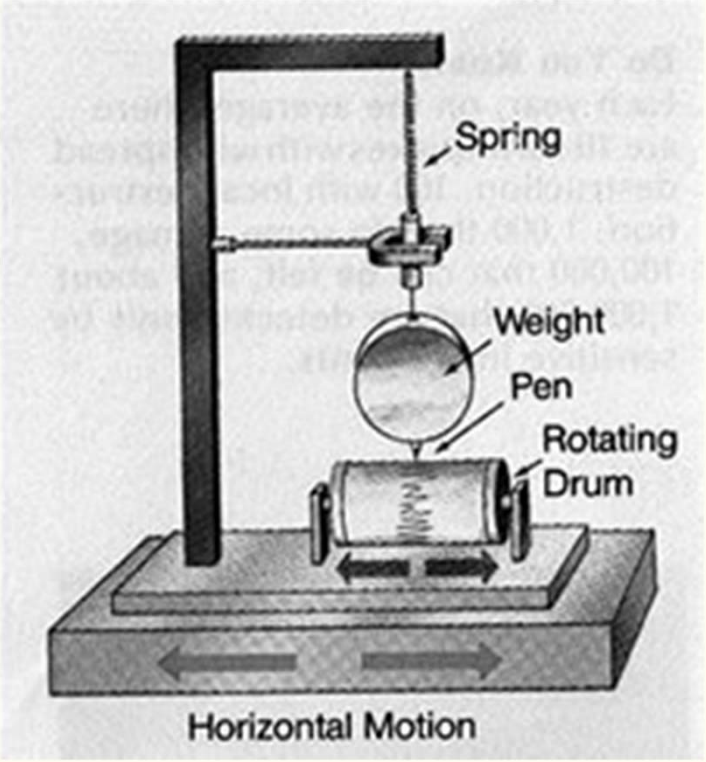


Measure?

Tapes don’t work when it comes to earthquakes! Seismograms are used to record and determine how large the earthquake was. A short wiggly line that doesn’t wiggle very much means a small earthquake, and a long wiggly line that wiggles a lot means a large earthquake. The length of the wiggle depends on the size of the fault, and the size of the wiggle depends on the amount of slip.



Seismograms



Location?

Seismograms record data on a seismograph. These graphs and the different types of waves come in handy for locating earthquakes. To understand how this works let's compare seismic waves to lightning and thunder. Light travels faster than sound, so during a thunderstorm you will first see the lightning and then you will hear the thunder. If you are close to the lightning, the thunder will boom right after the lightning, but if you are far away from the lightning, you can count several seconds before you hear the thunder. The further you are from the storm, the longer it will take between the lightning and the thunder. Equake detection follows a similar relationship.

Predict Earthquake?

NO! As of 2017, there are no instruments available that can actually predict an earthquake. Scientists have tried many different ways of predicting earthquakes, but none have been successful. On any particular fault, scientists know there will be another earthquake sometime in the future, but they have no way of telling when it will happen.

Maybe one day YOU will invent an instrument to predict earthquakes.

Seismic Engineering

Seismic Engineering is a branch of engineering that designs and analyzes structures, such as buildings and bridges, with earthquakes in mind. Its overall goal is to make such structures more resistant to damages due to earthquakes.

Seismic Engineer

Seismic engineers look at how a structure reacts and develop techniques that will prevent any damage in a minor quake and avoid serious damage or collapse in a major shake. Complete prevention is impossible however, buildings can be designed to fail in a “SAFE” way. The safe way allows occupants to escape or find better shelter before the structure collapses.

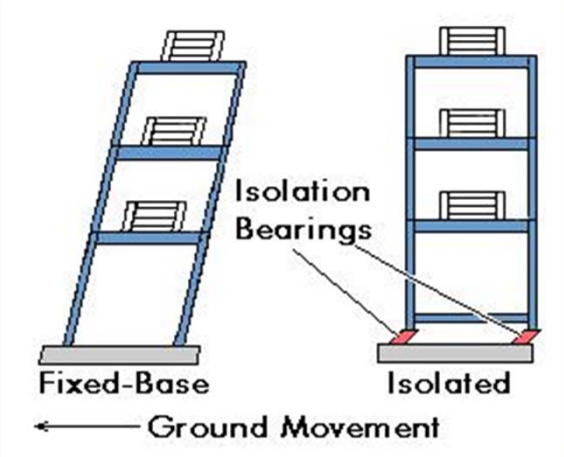
Many factors are involved in earthquake resistance techniques. Some of which included building material types, height of building, purpose of the structure, location and weather.

Earthquake Resistance Techniques

The design of buildings mainly focuses on the walls, roof and all the stuff inside to keep them standing. Earthquakes present a lateral, or sideways, load to the building structure that is a bit more complicated to account for. One way to to make a simple structure more resistant to these lateral forces is to tie the walls, floor, roof, and foundations into a rigid box that holds together when shaken by a quake.

Earthquake Resistance Techniques

Taller buildings require other techniques such as “base isolation.” Engineers have constructed skyscrapers that float on systems of ball bearings, springs and padded cylinders. They act like shock absorbers, isolating from the ground movement.



These buildings don’t sit directly on the ground, so they’re protected from some earthquake shocks. In the event of a major earthquake, they can sway up to a few feet.

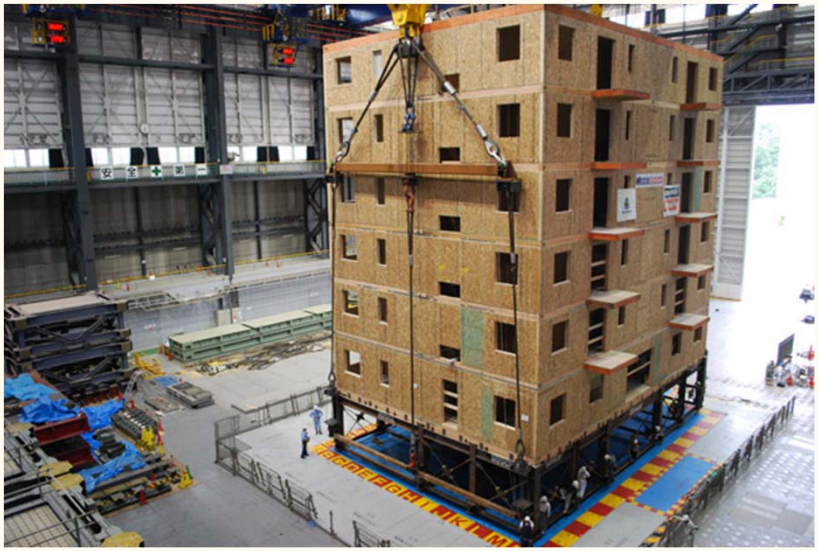
Earthquake Resistance Techniques

Another unique technique called “tuned mass damper” is used to reduce the sway of a building is the use of a large mass that can sway at the top of the building in opposition to the building sway.

The Taipei 101 has just such a giant pendulum mounted between the 88th and 92nd floors. Weighing in at 730 tons and capable of moving 5ft in any direction.

Shake table

For structures to resist earthquakes we need to create techniques to test and build structures that can withstand earthquakes. One technique is the use of a shake table. This is a device used to simulate ground motion and different types of earthquakes.



Which brings us to…

Seismic Resistance Structure Contest

Objectives

1. Competitors will build a structure using ONLY:

a. Wood stick (less than 5x5 mm thickness) -Do not use bamboo sticks
b. White school glue
c. Foam board (less than 7mm thick) – not to be used as wall covering
d. Construction paper

2. The structure is evaluated by the following measures:

a. Quantitative
   i. Shake table.
      Stage I: Test table will be shaking at 3 stages of speed; each will last 10s.
      Stage II: A wooden block will be placed and secured on the top of structure. Test table will be shaking for a certain speed
   ii. Height of the structure
   iii. Weight of the structure

b. Qualitative

Other qualities including your design process as evaluated by the judges.

Prizes!!

The prizes for first, second, and third place will be awarded to each category (Building Performance, Judges' Score).

1st	$50/Contestant/Team
2nd	$40/Contestant/Team
3rd	$30/Contestant/Team

General

A panel of adjudicators will resolve all disputes. Their decisions are final and binding.

Teachers, parents, guardians and their guests are required not to assist or interfere with the contestants.

Building specification and Rules must be followed in making the building.

Every effort must be taken to keep the premises and the surrounding environment **litter free**. All broken pieces must be stored in garbage bins.

Please put phones on silent or turned off

READY.
SET.

GO!