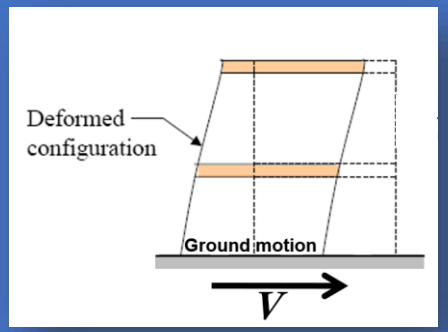
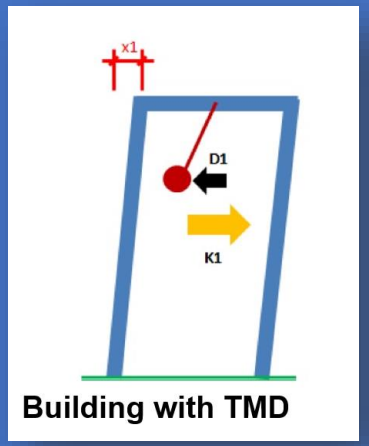
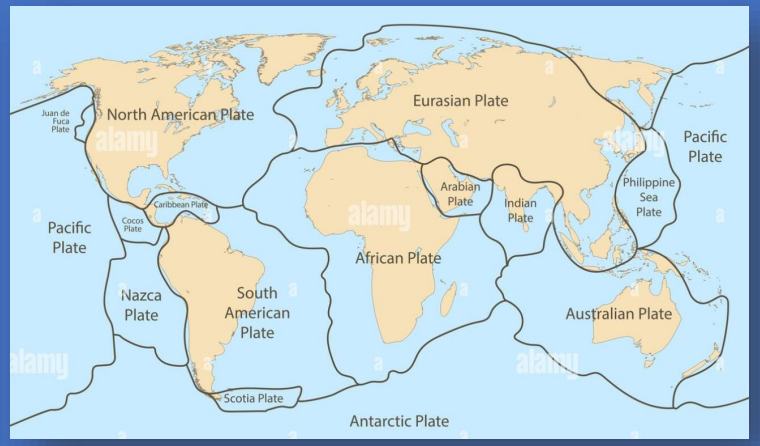
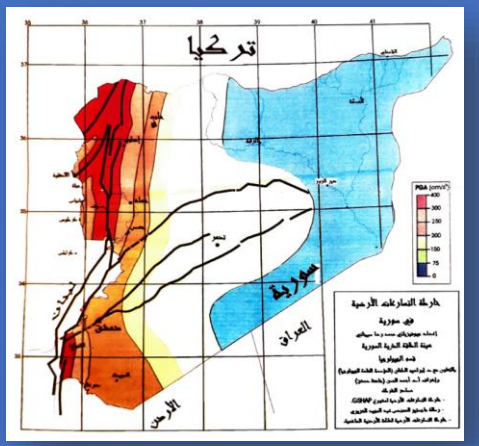
National Arab American Association of Engineers and Architects - NAAAEA



NAAAEA E-Newsletter – May 2023







Contents of this E-Newsletter

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President's Message

President's Message

Dear NAAAEA Chapter leaders and Chapter members:

As you have heard, Syria, Turkiye and neighboring countries were recently hit by a devastating earthquake that has left many families homeless and struggling to survive. The earthquake has caused immense destruction to the infrastructure in these countries.

NAAAEA invited the nine AAAEA Chapter leaders for a meeting, and as a result, we formed "**NAAAEA Disaster and Emergency Relief Technical Committee (DER-TC)".** Please encourage your members to sign up to be member of this committee by simply sending an email to info@nationalaaaea.org, or via NAAAEA website https://nationalaaaea.org/contact-us/

This issue of the newsletter includes information about this specific earthquake, and also general information on Earthquake Engineering and techniques used to mitigate the damage caused by earthquakes.

The last section of this newsletter is the updated NAAAEA-related items highlighting naaaea programs. All are encouraged to read and participate in these wide array of programs.

Thank you all

Looking forward to hearing from you.

Dr. Soliman Khudeira, PhD, SE, PE
NAAAEA President

National Arab American Heritage Month - April

National Arab American Heritage Month - April

NAAAEA was contacted by the **Women's Transportation Seminar (WTS) - Philadelphia**. WTS selected NAAAEA to be featured as part of their recognition of the National Arab American Heritage Month. WTS featured Dr. Hiba Abdalla (the current President of AAAEA-IL Chapter). Below is a copy of WTS article and the graphics – both are published on WTS-Philadelphia website.

WTS Philadelphia Recognizes National Arab American Heritage Month

WTS Article: "National Arab American Heritage Month (NAAHM) celebrates the rich and diverse Arab American heritage and culture and the achievements of Arab Americans and Arabic-speaking Americans with ancestries traced to 22 countries in the Middle East and North Africa. While Arab American heritage has been celebrated since the 1990s, in 2021, April was federally declared National Arab American Heritage Month.

In recognition of NAAHM, WTS Philadelphia is spotlighting the National Arab American Association of Engineers and Architects (NAAAEA). NAAAEA is a professional association that promotes and advocates Arab American Engineers, Architects and Information Technology professionals in the U.S., by providing career and educational enhancement programs, grants, scholarships, mentorship and community service. NAAAEA was founded in 1996 by a small group that was committed to form an organization to support Arab Americans in the engineering, architectural and IT industry. In less than 20 years, this organization has grown to be a national organization with nine chapters ranging from New York to California!

We would also like to shine this spotlight on Hiba Abdalla, PhD, PE, SE, who is the President of the AAAEA Illinois Chapter. Hiba has a passion for helping members grow and transform their lives, their careers and their communities. She oversees all of the AAAEA-IL programs and initiatives, including scholarships, educational programs, technical events, career development sessions and much more. Hiba is also an accomplished structural engineer with Parsons Corporation. For those interested in learning more, please visit **https://arabamericafoundation.org/national-arab-american-heritage-month/** and **https://nationalaaaea.org/**."

See:www.wtsinternational.org/news/wts-philadelphia-recognizes-national-arab-american-heritage-month

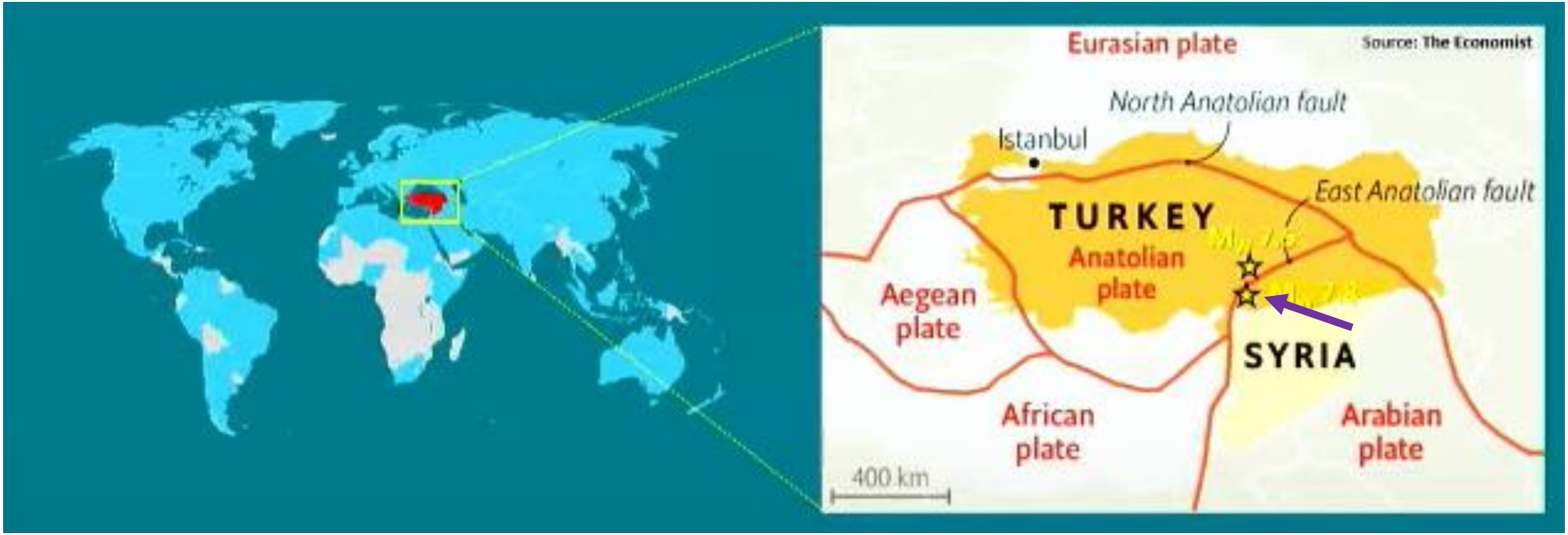
Turkiye-Syria Earthquake

Turkiye-Syria Earthquake

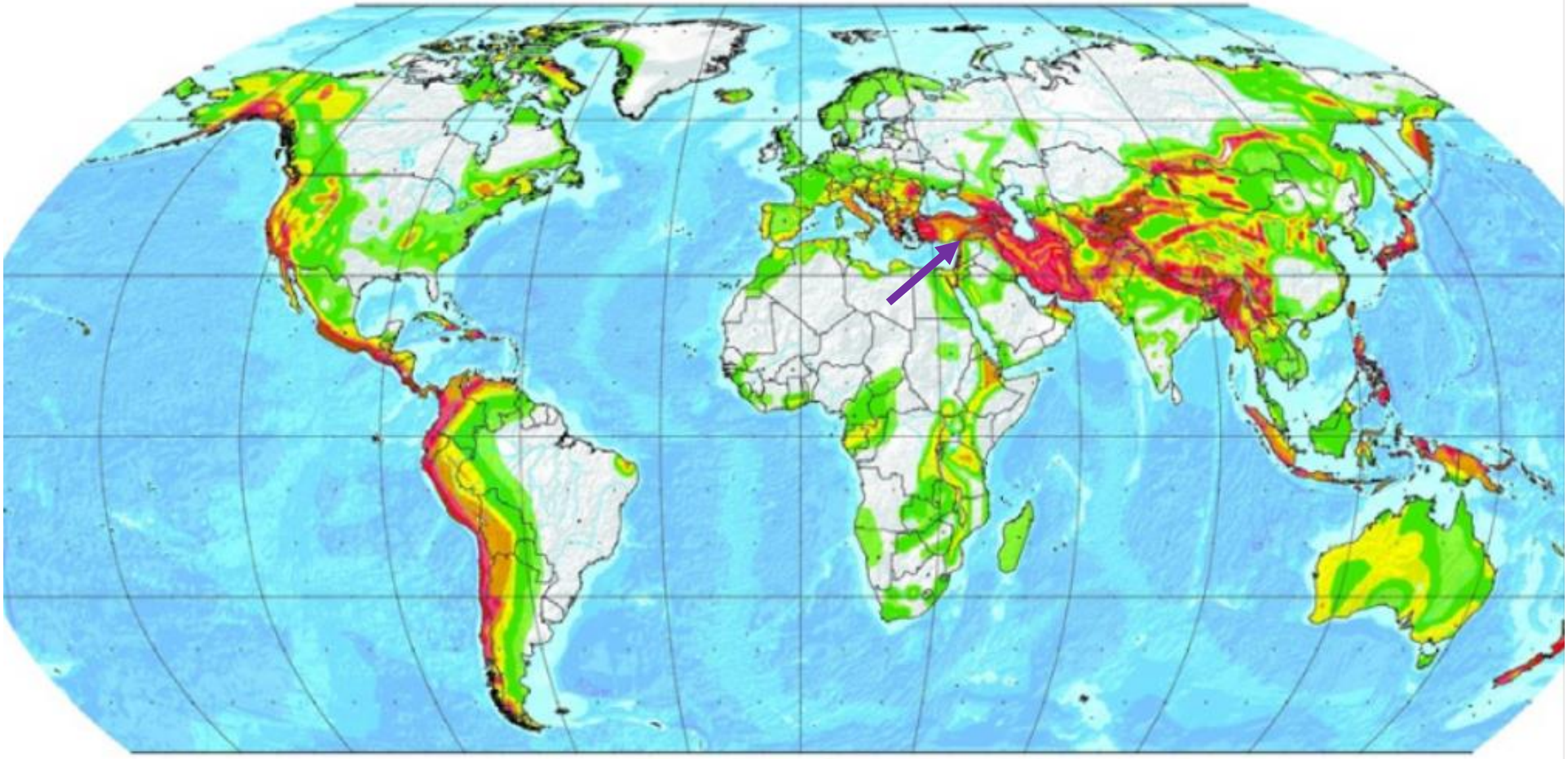
February 6, 2023, Earthquake

- 7.8-magnitude (Richter) earthquake
- Followed by 7.5-magnitude earthquake and many aftershocks
- 240,000 buildings damaged or destroyed
- 60,000 deaths
- 110,000 injured
- 10 million affected
- 3 million homeless
- Damage is estimate to be over $50B.

Turkiye-Syria Earthquake



Seismic hazard world map



Turkiye-Syria Earthquake

Turkiye-Syria Earthquake

Turkiye-Syria Earthquake

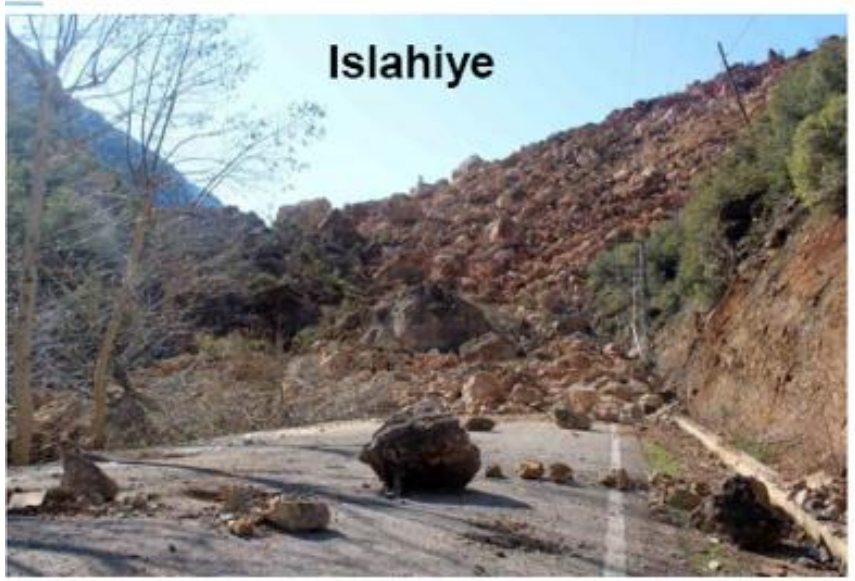
Turkiye-Syria Earthquake

Turkiye-Syria Earthquake

Turkiye-Syria Earthquake – Geotechnical

Lateral spread: Migration toward the lake

Turkiye-Syria Earthquake – Geotechnical



Slope Failures (Land Slides)

Rockfalls

Turkiye-Syria Earthquake – Transportation Facilities: Geotechnical

Sinkholes

Turkiye-Syria Earthquake – Dams

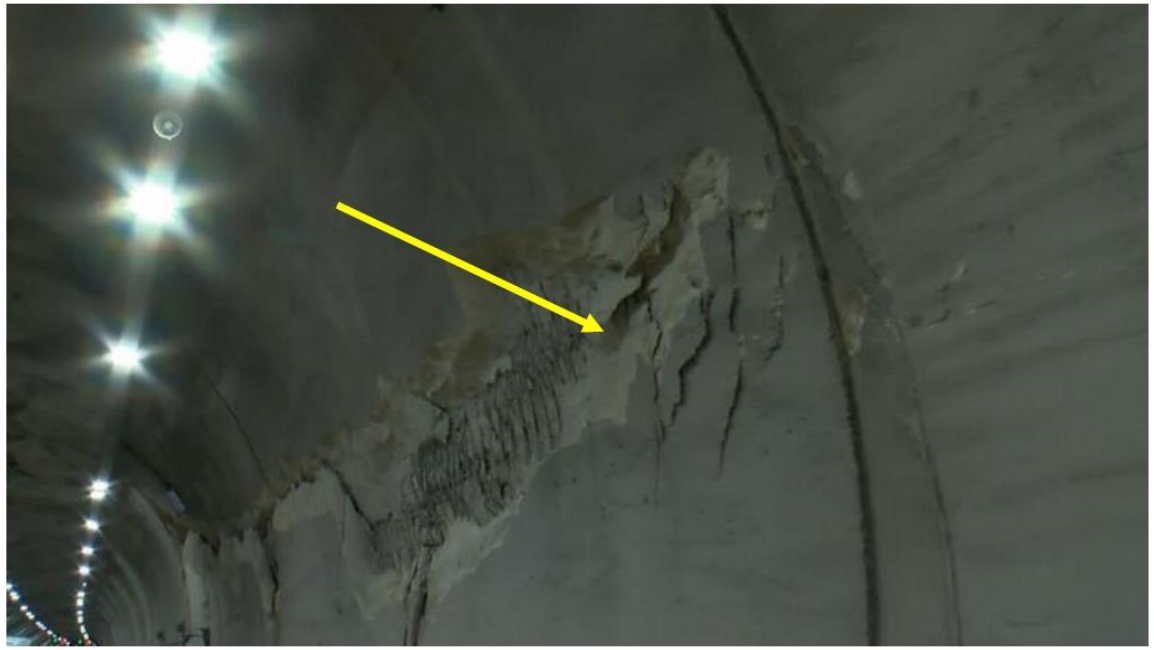
Damage to Dams

Turkiye-Syria Earthquake – Transportation Facilities: Roadways and Bridges

Roadway pavement failure

Bridge superstructure failure

Turkiye-Syria Earthquake – Transportation Facilities: Tunnels



Spalling of concrete linings in Erkenek Tunnel

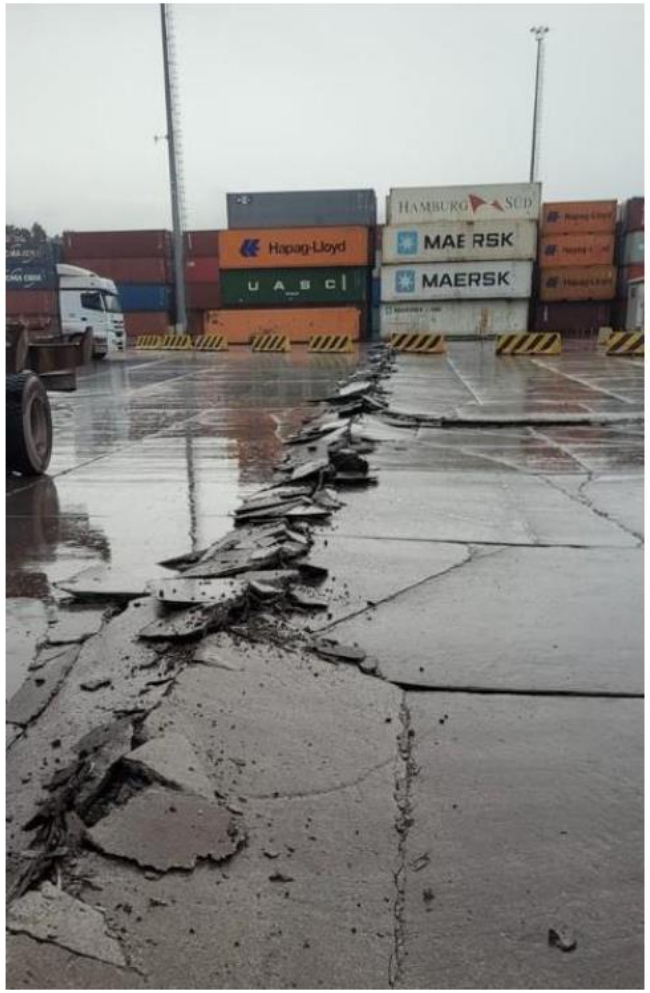
Turkiye-Syria Earthquake – Transportation Facilities: Railways

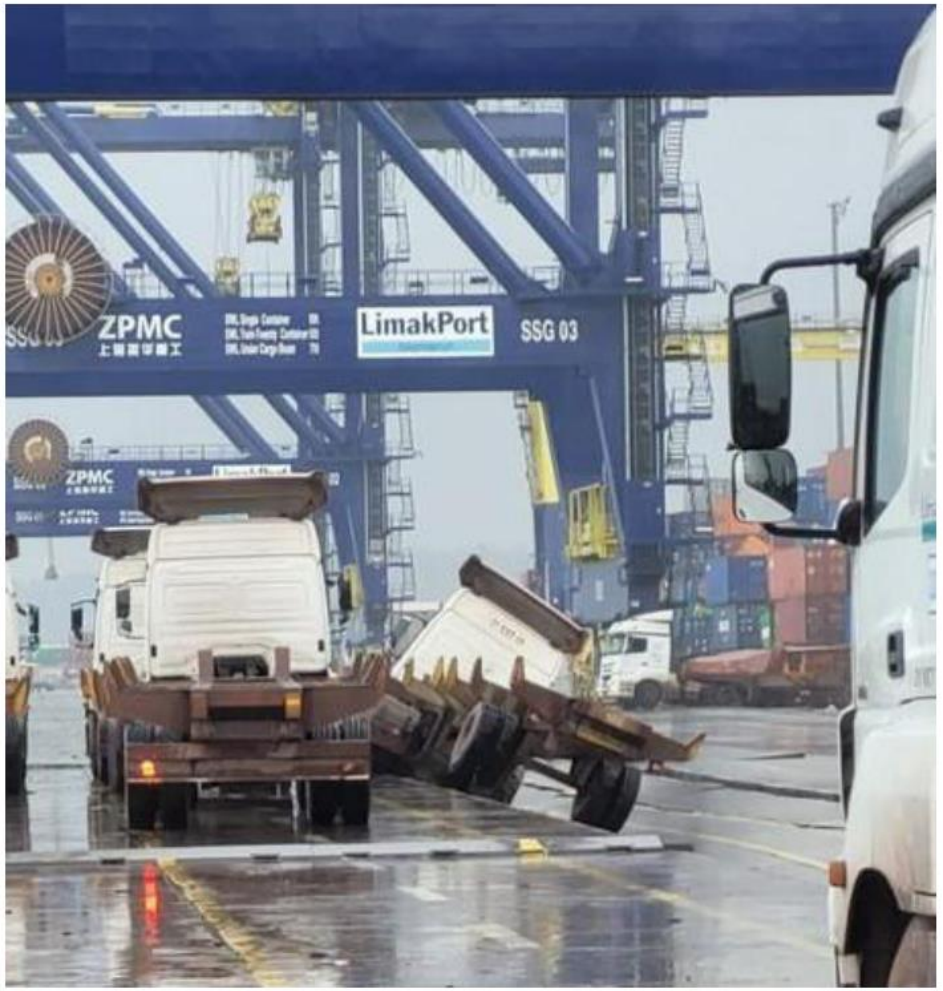
Turkiye-Syria Earthquake – Transportation Facilities: Airports

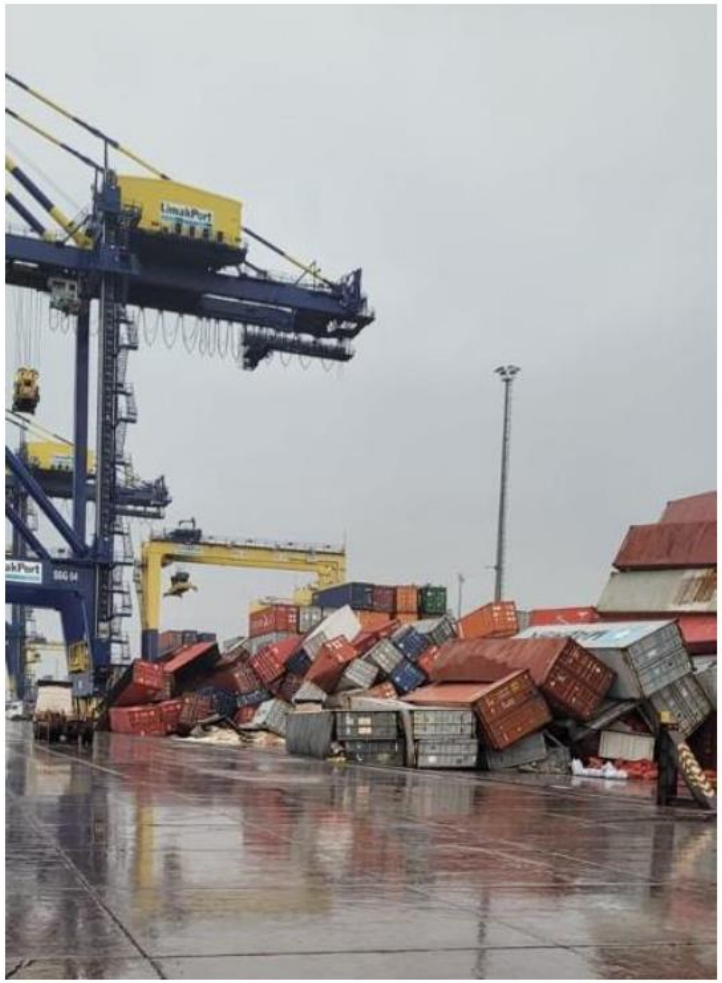
Ground settled around the terminal building at Hatay Airport

Runway buckled at Hatay Airport

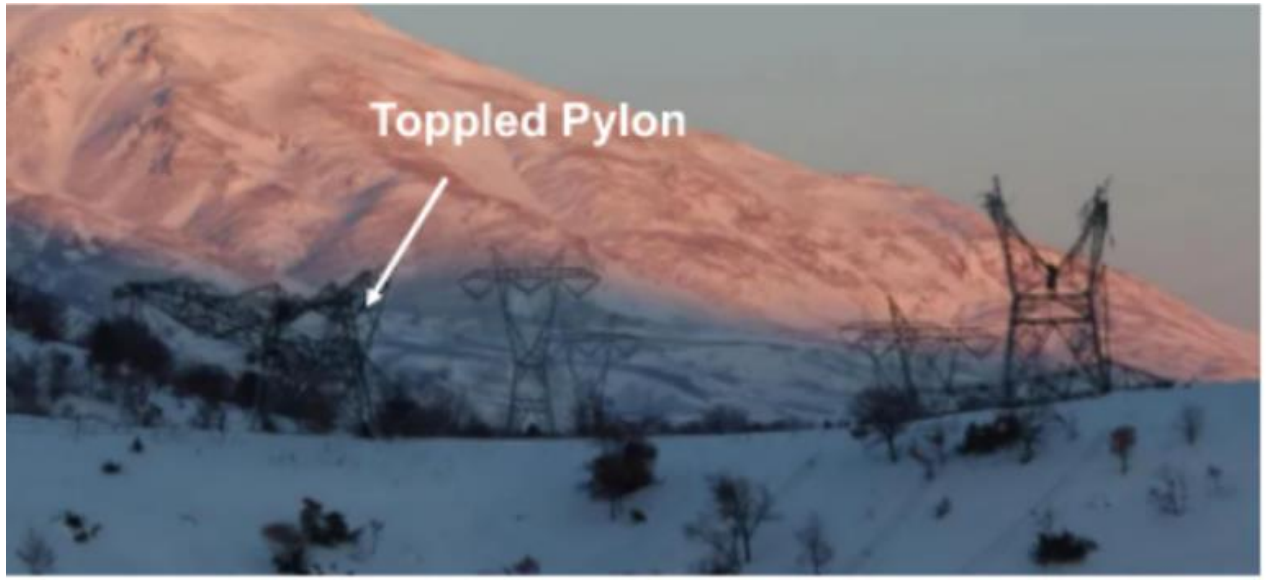
Turkiye-Syria Earthquake – Transportation Facilities: Ports







Turkiye-Syria Earthquake – Transportation Facilities: Lifelines



Turkiye-Syria Earthquake - Damaged and Collapsed Reinforced Concrete (RC) Buildings

These structures are designed as **moment-resistant frames with masonry in-fill walls.**

Causes of Collapse:

1. Materials:

- **Poor quality:** Low strength concrete (poor mix design), smooth reinforcing bars were used. Poor concrete mix design caused a brittle failure.

2. Construction:

- **Poor QA/QC:** Example: Stirrups were very few at the beam-column joint, overlap of reinforcement
- **Masonry in-fill walls:** Walls has poor contact with the columns and beams, which had no effect against the earthquake loading and they subsequently failed.

3. Design:

- **Soft Story:** Ground floors are open (used as shops, storage, or parking). Some of the lateral load resisting elements (bracings or shear walls) were either removed from the ground level or not correctly designed. This results in a story with low lateral stiffness (i.e., excessive lateral displacements), and hence failure of the columns (plastic hinges).
- **Details:** Insufficient connection details in the drawing. Example: the rebars overlap of columns to beams was not properly detailed and constructed
- **Outdated codes:** Seismic building codes in the area required buildings to be able to sustain earthquakes with 0.4g acceleration (without incurring complete failure). However, the 7.8 earthquake had acceleration higher than 1.0g
- **Lack of Ductility:** Designs are not made to provide adequate ductility of the structural elements.

Causes of Collapse (continue):

4. Regulations:

- **Amnesty:** The government has provided periodic **"construction amnesties**". Theses are legal exemptions: payment of a fee for structures built without the required **safety certificate.**
- **Retrofitting older buildings:** Many were built before building codes legislating disaster resilience came into effect, and only limited number have been retrofitted to current standards
- **Inspection:** inspection is not done independently, but through a 3rd party that is selected, hired, and paid by the contractor!!!

5. Resonance:

- Natural periods of the collapsed buildings coincided with input earthquake waves. This resulted in a resonance-like shaking of the structures which caused the collapse.

6. Pounding of adjacent structures:

- Buildings at the corners of streets were mostly collapsed as a result of pounding from the adjacent building.

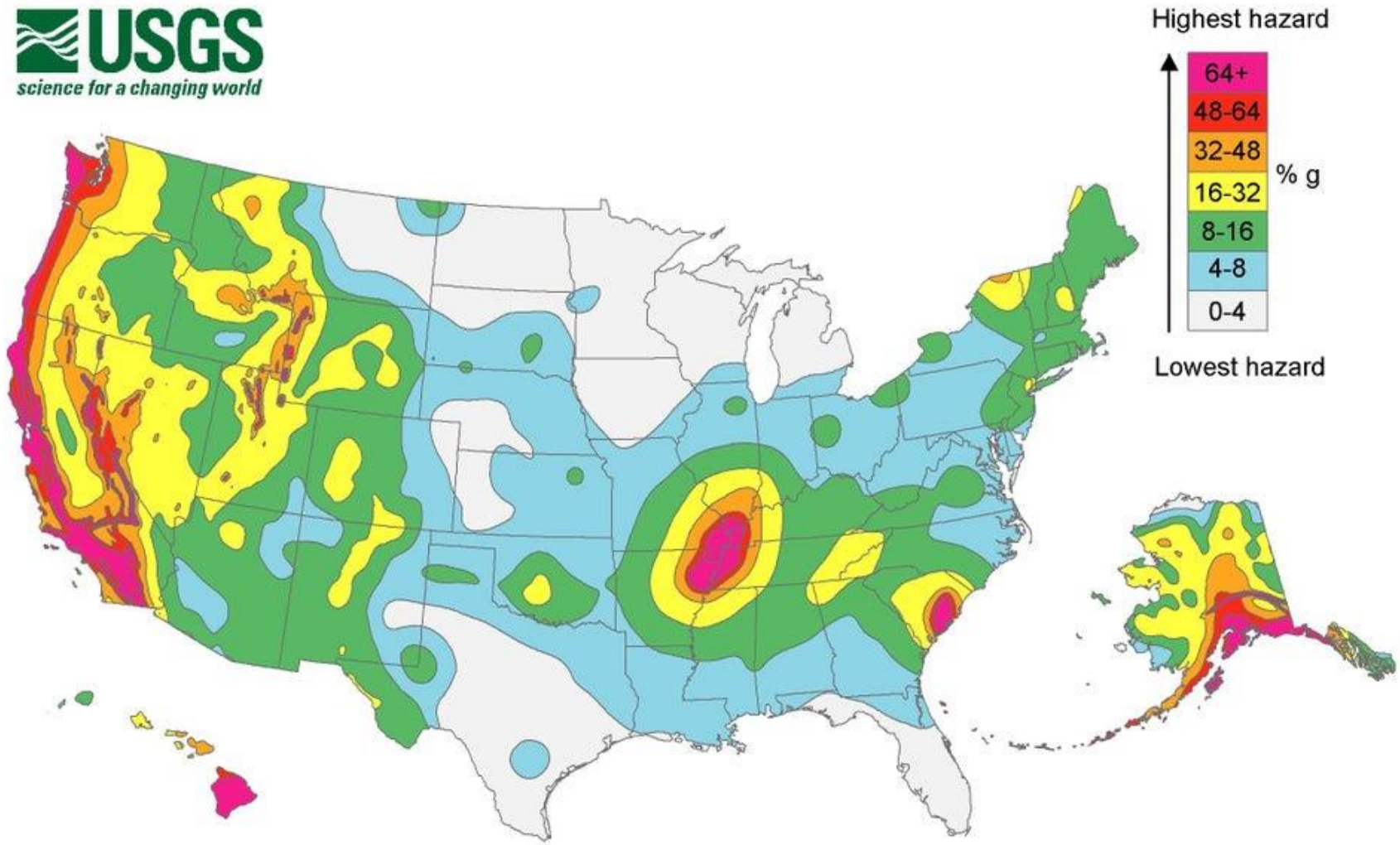
Recommendations to avoid building failures during future earthquakes

1. QA/QC (inspection) must be done by an independent third-party that is hired and paid for by the governmental agency, neither by the contractor nor by the building owner
2. In addition to QA/QC by the government agency, the contractors should be required to also have their own documented QA/QC program.
3. Codes: Update the building codes to account for current earthquake demand
4. Education: require contractors to take and pass training and obtain certificates related to construction details and practices
5. Require the design to be peer-reviewed by Licensed Structural Engineers
6. Require all design drawings to include seismic-related details
7. Strengthen regulations against violators
8. Actively retrofit existing buildings prior to the earthquake
9. Introduce other building materials (steel, timber, etc.)
10. Design all new building for ductility (i.e., energy absorption by deformation) and redundancy (i.e., multiple load paths)
11. Design concept should be based on weak-beams strong-columns for a fail-safe design
12. Designing proper structural connections to allow safe transfer of forces between members
13. Using bracing and shear walls, rather than only members-resisting frames
14. Using more modern approaches: base-isolation, energy dissipation dampers, ….

Earthquake – General Information

- Earthquake Basics
- Earthquake Statistics
- Tectonic Plates

Seismicity Map of the US



Earthquake Intensity - Modified Mercalli Intensity (MMI) Scale

MMI is a common measure of earthquake **Intensity (destructiveness)**

MMI depends on the magnitude (which is measured in Richter) and distance from the epicenter

MMI is not useful for design of structures against earthquakes. Instead, we use ground acceleration (g) as an engineering measure of intensity. Ground acceleration is described as fractions of the gravity acceleration (g)

Design codes provide estimates of ground accelerations for design in different areas. These estimates are generally based on a statistical data using a reasonable return period that exceeds the useful life of the structure. The US Geological Survey also has a website that can be used to estimate the ground acceleration for a given site.

Earthquake Intensity - Modified Mercalli Intensity (MMI) Scale

Mercalli Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by very few alert people.
II	Weak	Felt only by a few people at rest.
III	Weak	Felt indoors, especially on upper floors.
IV	Light	Felt indoors by many, outdoors by few.
V	Moderate	Felt by nearly everyone; many awakened.
VI	Strong	Felt by all, and many are frightened.
VII	Very strong	• Damage is negligible to buildings of good design and construction. • Damage is slight to moderate in well-built ordinary structures. • Damage is considerable in poorly built or badly designed structures.
VIII	Severe	• Damage is slight in specially designed structures. • Damage is considerable in ordinary buildings, with partial collapse. • Damage is great in poorly built structures.
IX	Violent	• Damage is considerable in specially designed structures. • Damage is great in substantial buildings, with partial collapse. • Buildings are shifted off foundations. • Liquefaction occurs. • Underground pipes are broken.
X	Extreme	• Some well-built wooden structures are destroyed. • Most masonry and frame structures are destroyed. • Rails are bent. • Landslides considerable.
XI	Extreme	• Few, if any, masonry structures remain standing. • Bridges are destroyed. • Underground pipelines are rendered completely out of service. • Rails are bent.
XII	Extreme	• Damage is total. • Waves are seen on the ground surfaces. • Objects are thrown upward into the air.

Earthquake Magnitude (M) – Richter Scale

Earthquake Magnitude (M) is given in a unit called "Richter" and it is a measure of the energy released during an earthquake

The Magnitude (M) is related to the energy released (E):

$$\boldsymbol{log_{10} E = 11.8 + 1.5M}$$

where,
$\boldsymbol{E}$ = Energy in ergs
$\boldsymbol{M}$ = Magnitude in Richters
1 erg = 7.375621×10^{-8} ft·lbf

Earthquake Intensity:
(Modified Mercalli Intensity - MMI) vs. (Richter Scale: Magnitude)

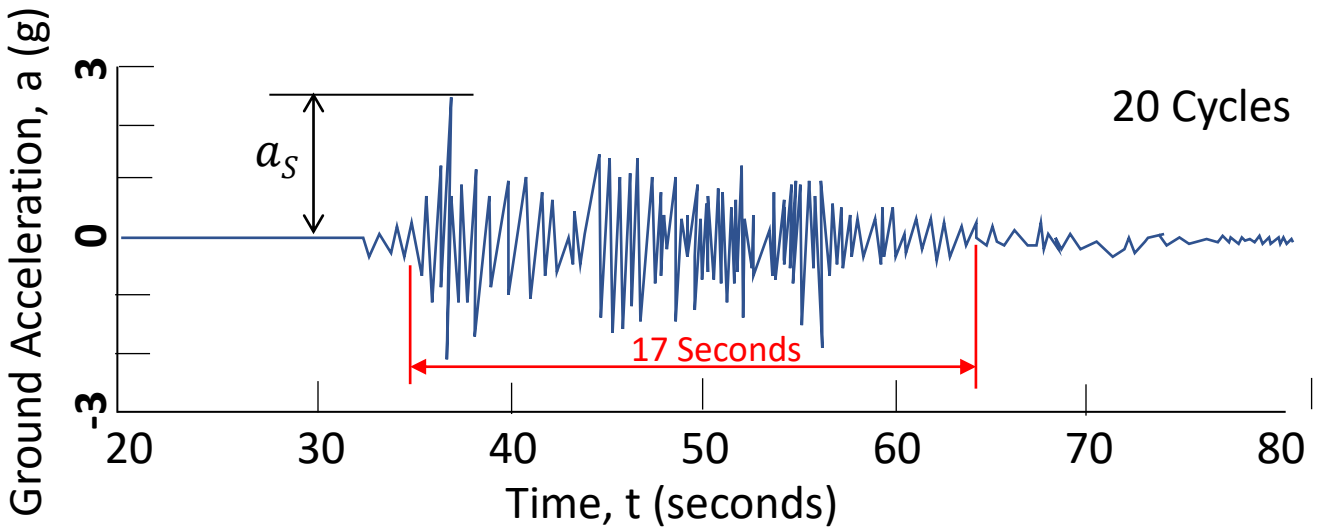
Intensity vs. Magnitude:

- Intensity (using MMI) changes depending on the location
- Intensity is a measure of severity and destructiveness of the earthquake
- Far places from the epicenter will experience less intensity
- Magnitude (in Richter) is just one number representing the size of the earthquake (energy released)

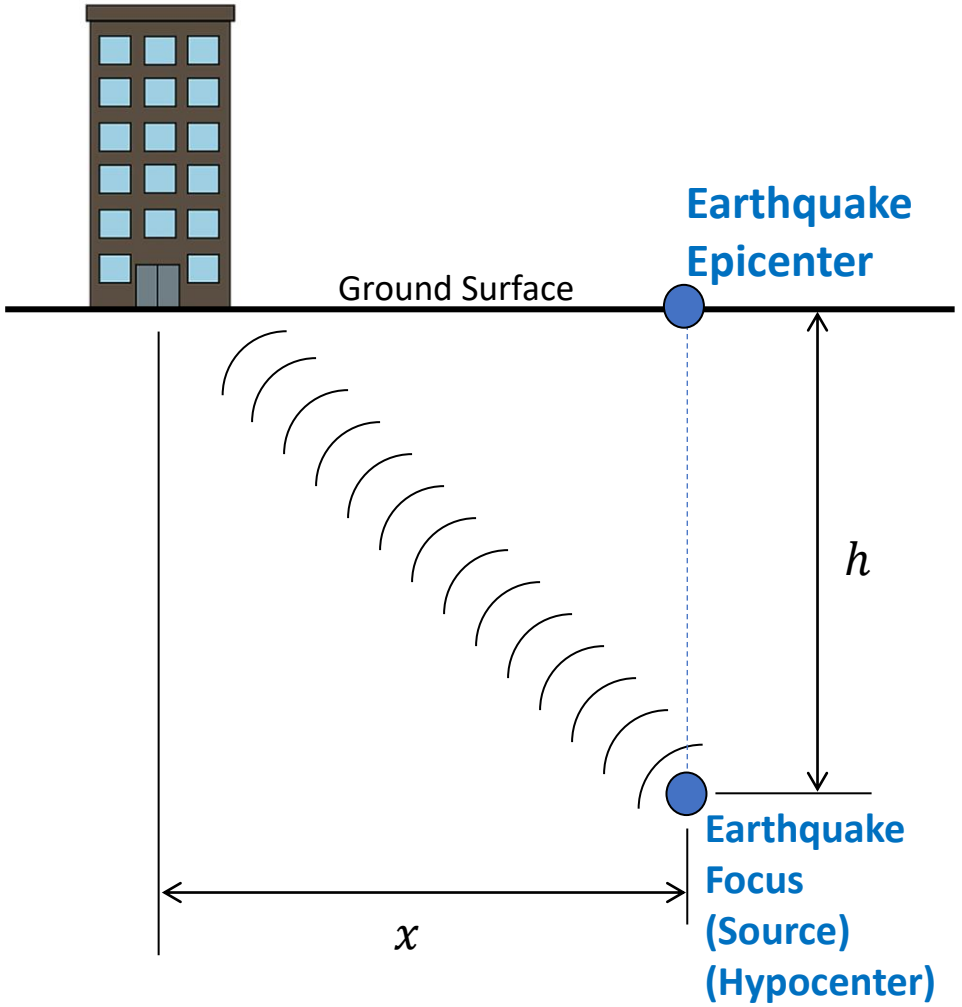
Mercalli Intensity	Shaking	Richter Magnitude
I	Not felt	1 to 2
II	Weak	2 to 3
III	Weak	3 to 4
IV	Light	4
V	Moderate	4 to 5
VI	Strong	5 to 6
VII	Very strong	6
VIII	Severe	6 to 7
IX	Violent	7
X	Extreme	7 to 8
XI	Extreme	8
XII	Extreme	8 to 9.5

Ground Acceleration during an Earthquake

The applied force on the structure from an earthquake is obtained based on the estimated ground acceleration (a_S) at the site

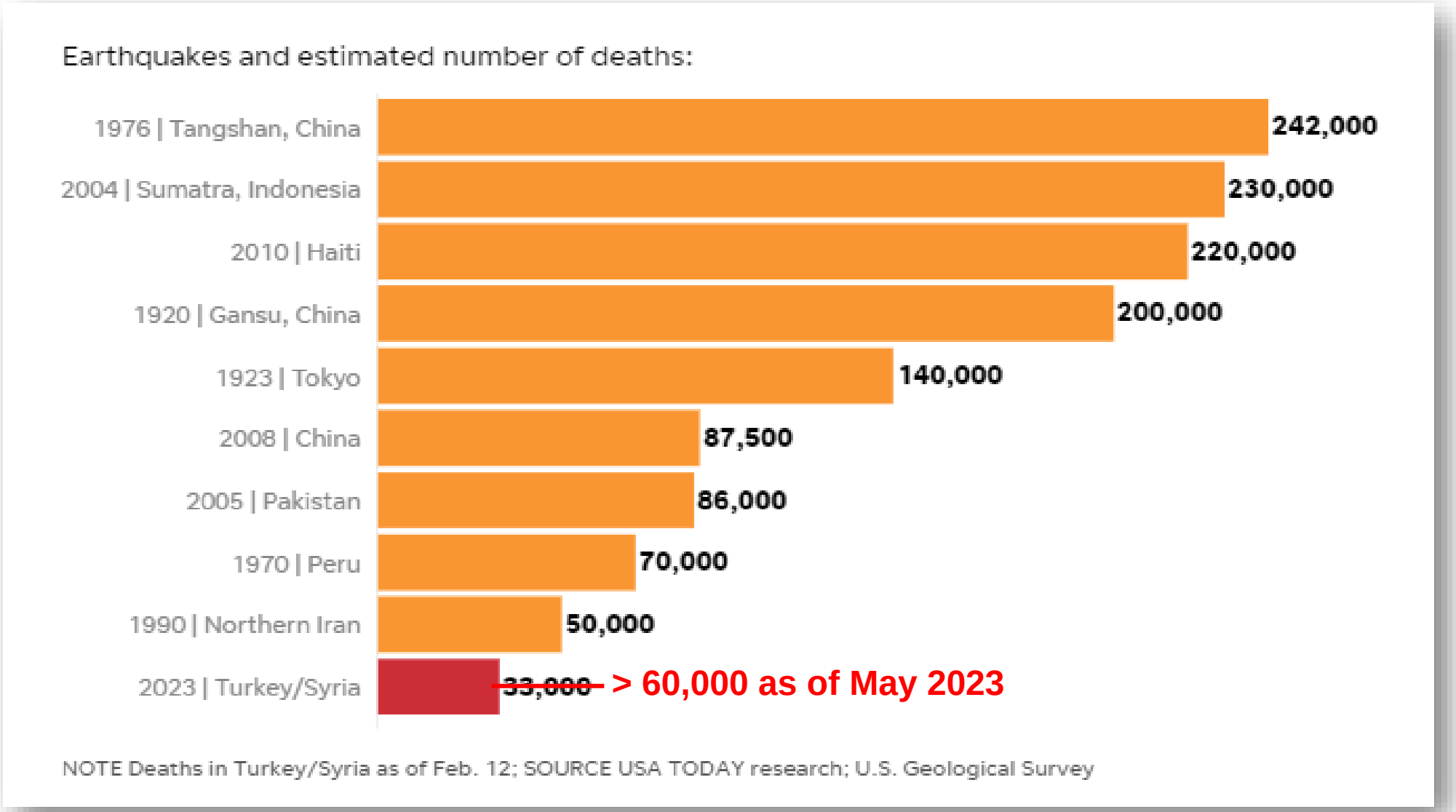


Acceleration History of an Earthquake



Earthquake Statistics

Deadly Earthquakes



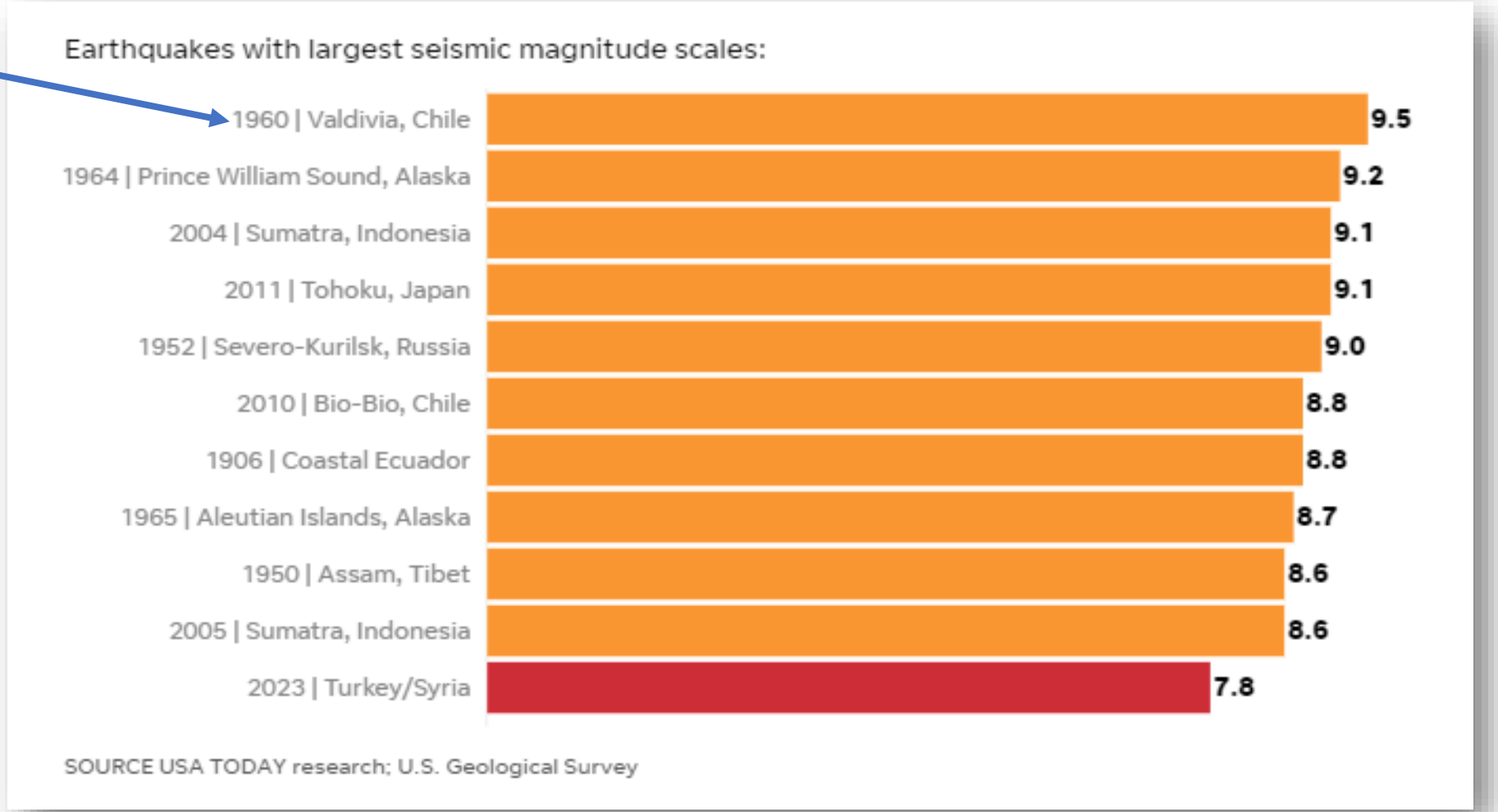
Largest Earthquakes – Richter Scale

Largest earthquake ever recorded:

. 1960 Chile

. Magnitude = 9.5 Richters)

. Energy E= 1.5×10^{17} ft.lbf



Earthquake Insurance

- Residents of the New Madrid Seismic Zone remain largely uninsured
- The number of residences with earthquake coverage has declined dramatically: fell from 60% in 2000, to 13% in 2020
- Standard homeowners' insurance generally does not cover damage resulting from **land movement** or **landslides.** Therefore, Earthquake coverage must be purchased separately.

Post-Earthquake Fire

Fire after the Earthquake. Main causes:

- Ruptured gas lines,
- Roads are inaccessible for fire trucks, and
- Damaged lifelines (water mains)

1906 San Francisco earthquake:

- The earthquake lasted less than a minute
- The earthquake ignited fires that burned for 3 days and destroyed 500 city blocks (**28,000 buildings)**
- Watermains were damaged and firefighters cold not use the fire hydrants

Turkiye-Syria Earthquake - Fire

Tectonic Plates

Major Tectonic Plates

Any plate with an **area > 20 million km^2**

1. African Plate
2. Antarctic Plate
3. Eurasian Plate
4. Indo-Australian Plate
5. Australian Plate
6. Indian Plate
7. North American Plate
8. Pacific Plate
9. South American Plate

Minor Tectonic Plates

Smaller plates compared to major plates **1 million km^2 < area < 20 million km^2**

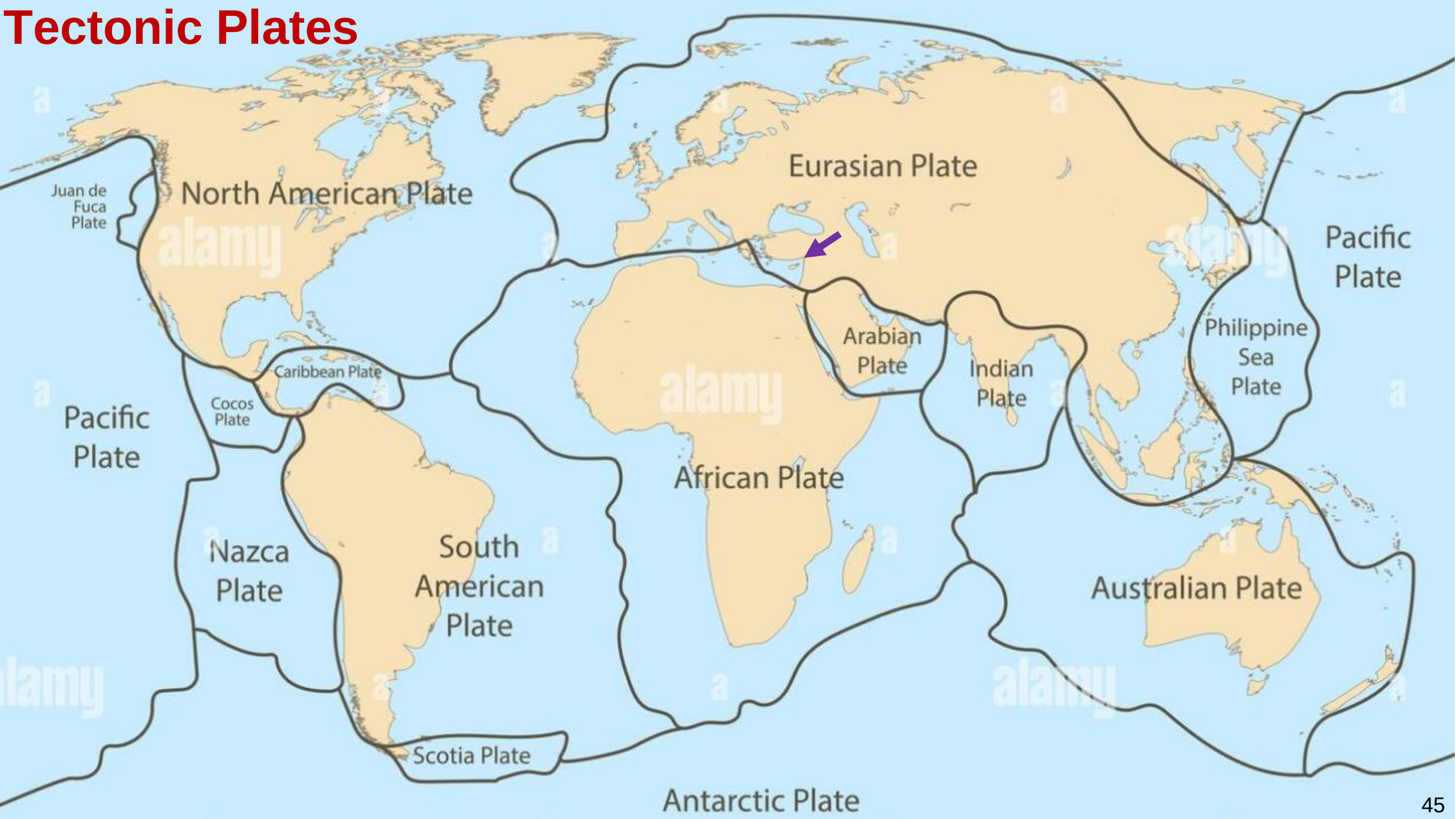
1. Amurian Plate
2. Arabian Plate
3. Burma Plate
4. Caribbean Plate
5. Caroline Plate
6. Cocos Plate
7. Indian Plate
8. Nazca Plate
9. New Hebrides Plate
10. Okhotsk Plate
11. Philippine Sea Plate
12. Scotia Plate
13. Somali Plate
14. Sunda Plate
15. Yangtze Plate

Micro Tectonic Plates

Micro plates is any plate with an **area < 1 million km^2**

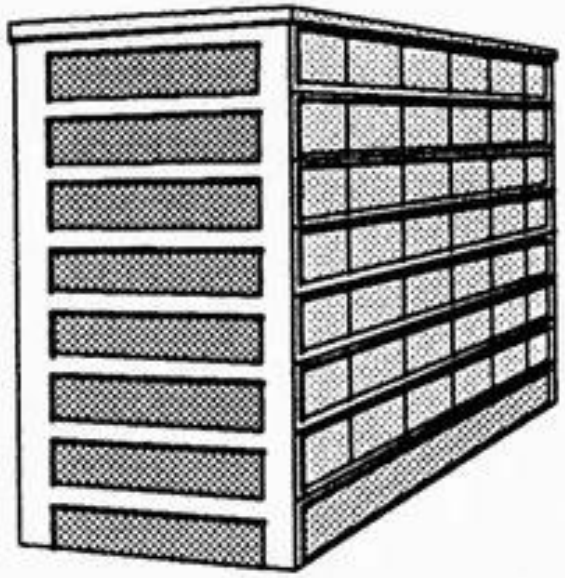
Micro plates are often grouped with the adjacent larger plate

Tectonic Plates

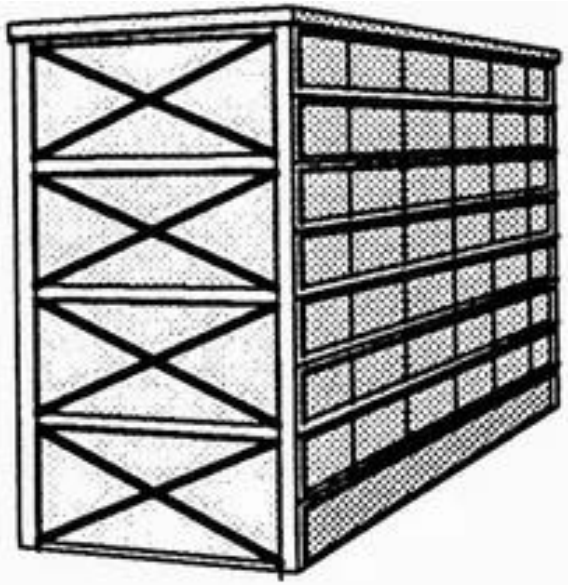


Design to Resist Earthquake Forces

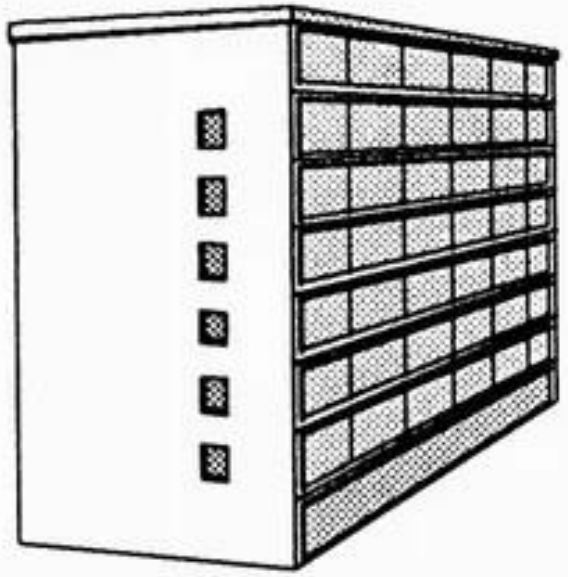
Structural Systems



Moment-Resisting Frame

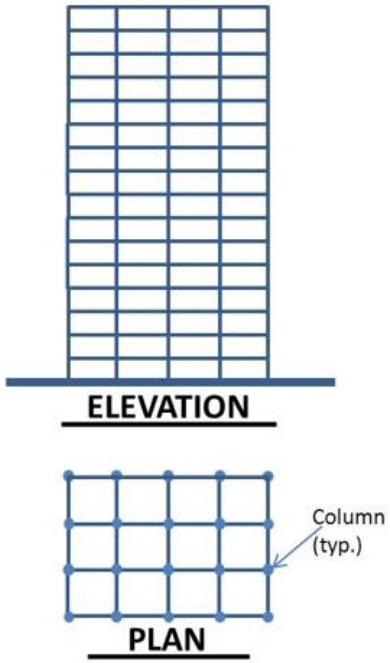


Braced Frame

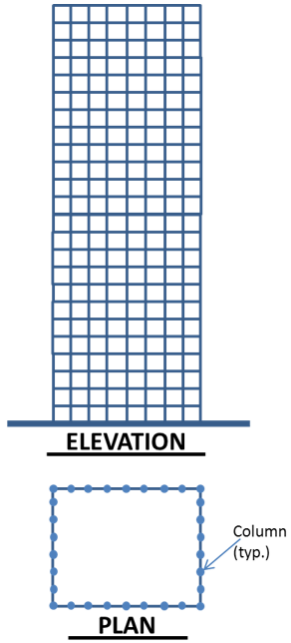


Shear Wall

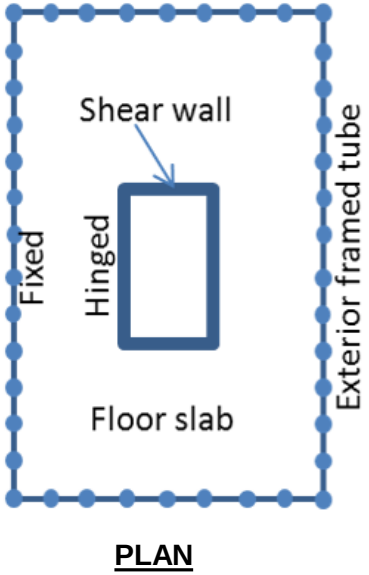
Frame Systems



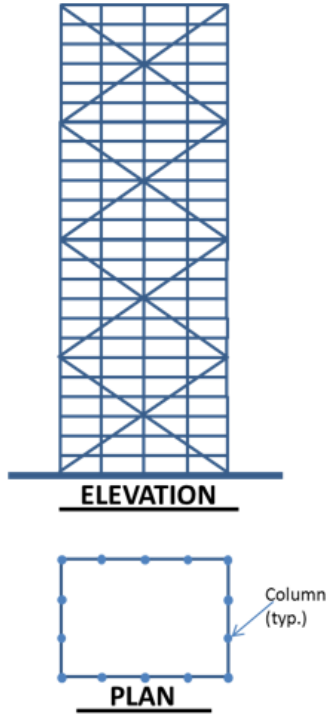
1. Rigid frame



2. Framed-tube



3. Shearwall-frame



4. Trussed-tube

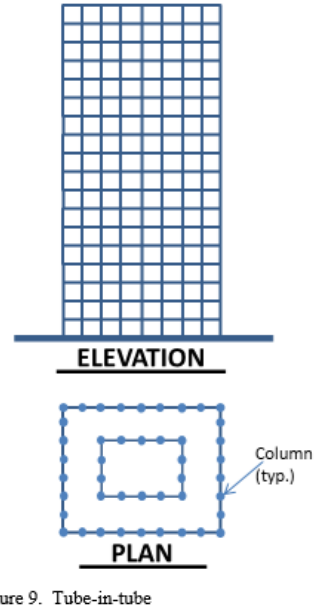
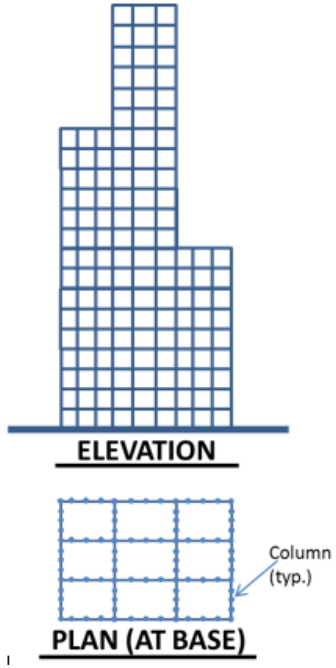


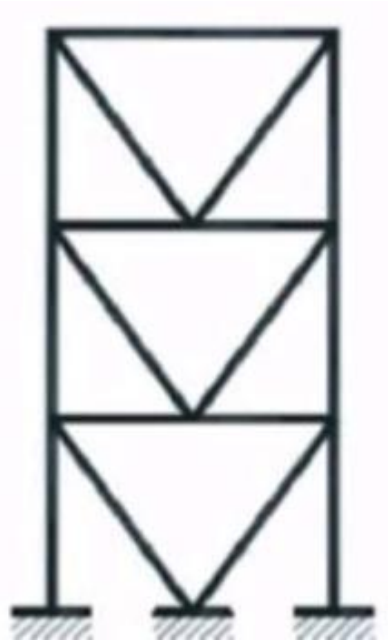
Figure 9. Tube-in-tube

5. Tube-in-tube

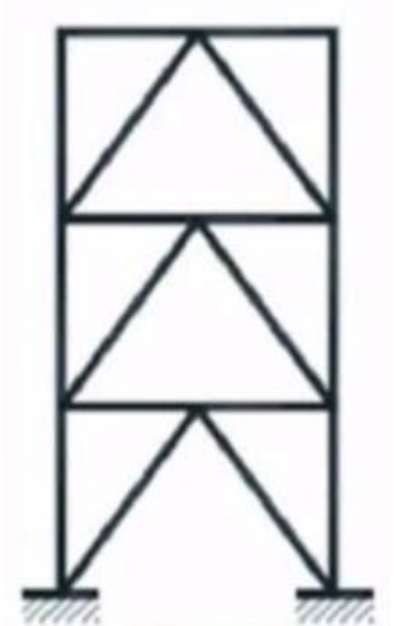


6. Bundled-tube

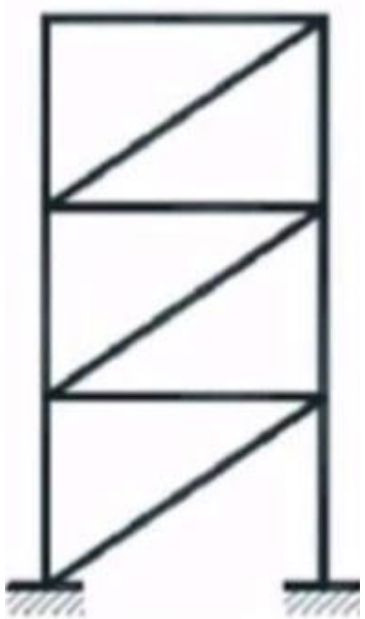
Bracing Systems



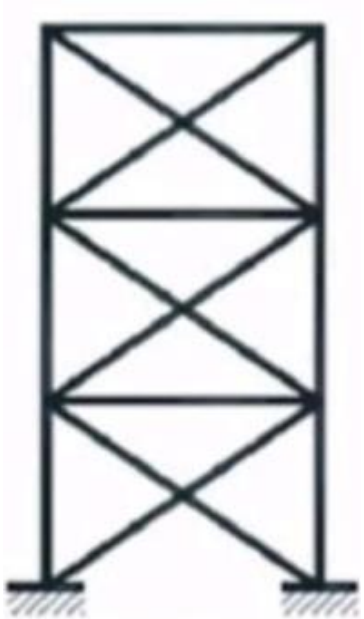
V-Bracing



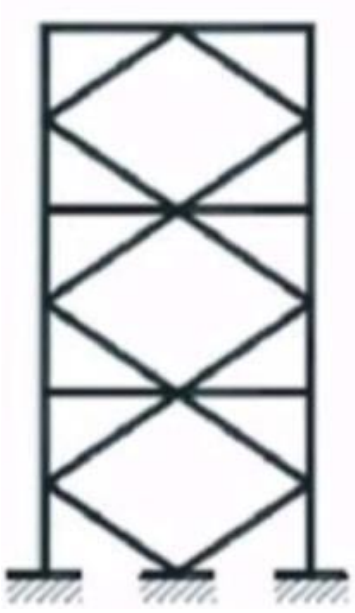
Inverted V-Bracing



Diagonal Bracing



X-Bracing



K-Bracing

Shear Walls

Modern Techniques to Resist Earthquake Forces

Modern Methods to Resist Earthquake Forces

1. Base Isolation
2. Seismic Energy Dissipation:
   - Tuned Mass Dampers (TMD),
   - Tuned Liquid Dampers (TLD), and
   - Viscous Dampers
3. Carbon Fiber Reinforced Polymer (CFRP)
4. Performance Based Seismic Design (PBSD)

Seismic Base Isolation

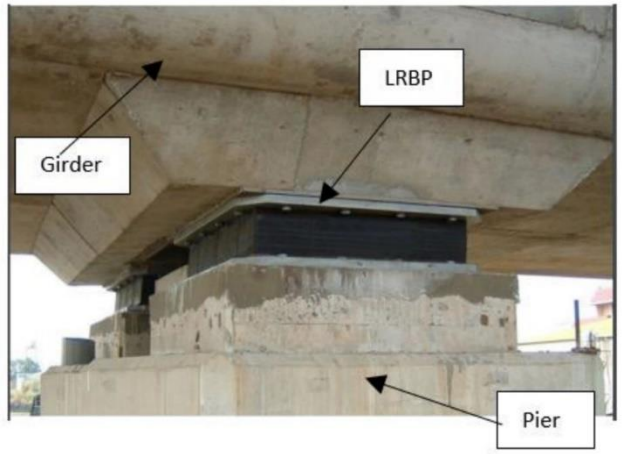
The objective of seismic isolation systems Is to prevent the superstructure from absorbing the earthquake energy, thus drastically reducing shear and bending stresses in the superstructure

Displacement and yielding are concentrated at the isolation devices, and the superstructure behaves like a rigid body.

Some isolators are also designed to add substantial damping.

Some of the commonly used isolation systems are:

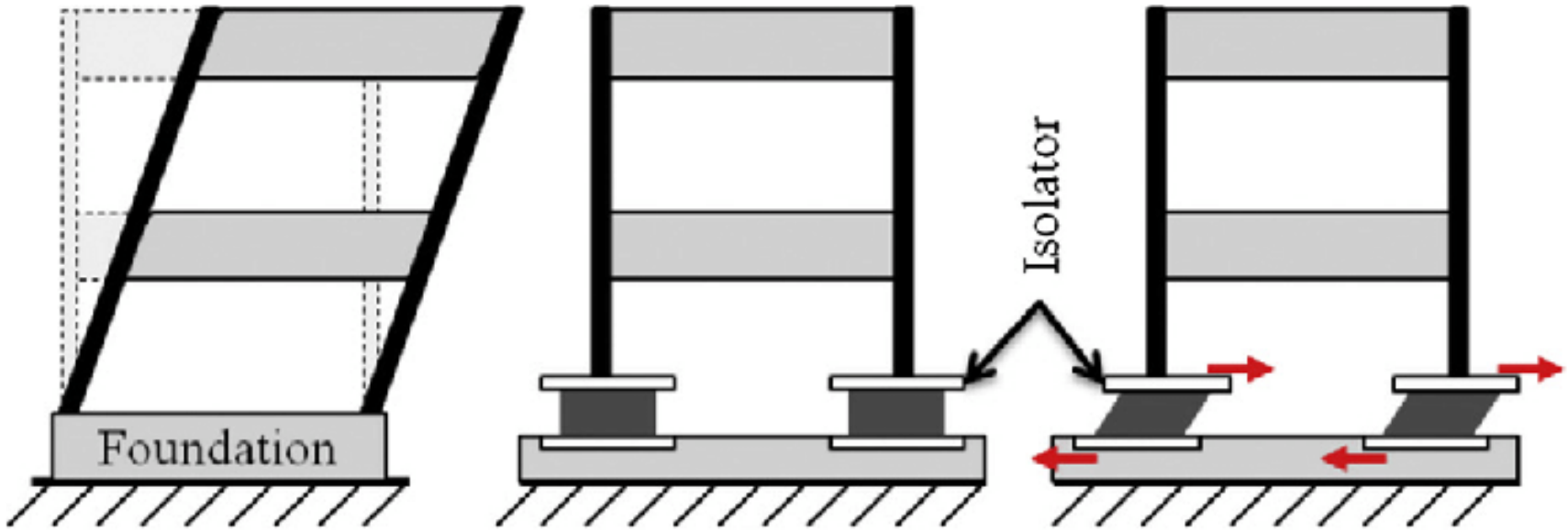
- Laminated rubber (or elastomeric) bearings, and .
- Sliding isolation bearings.



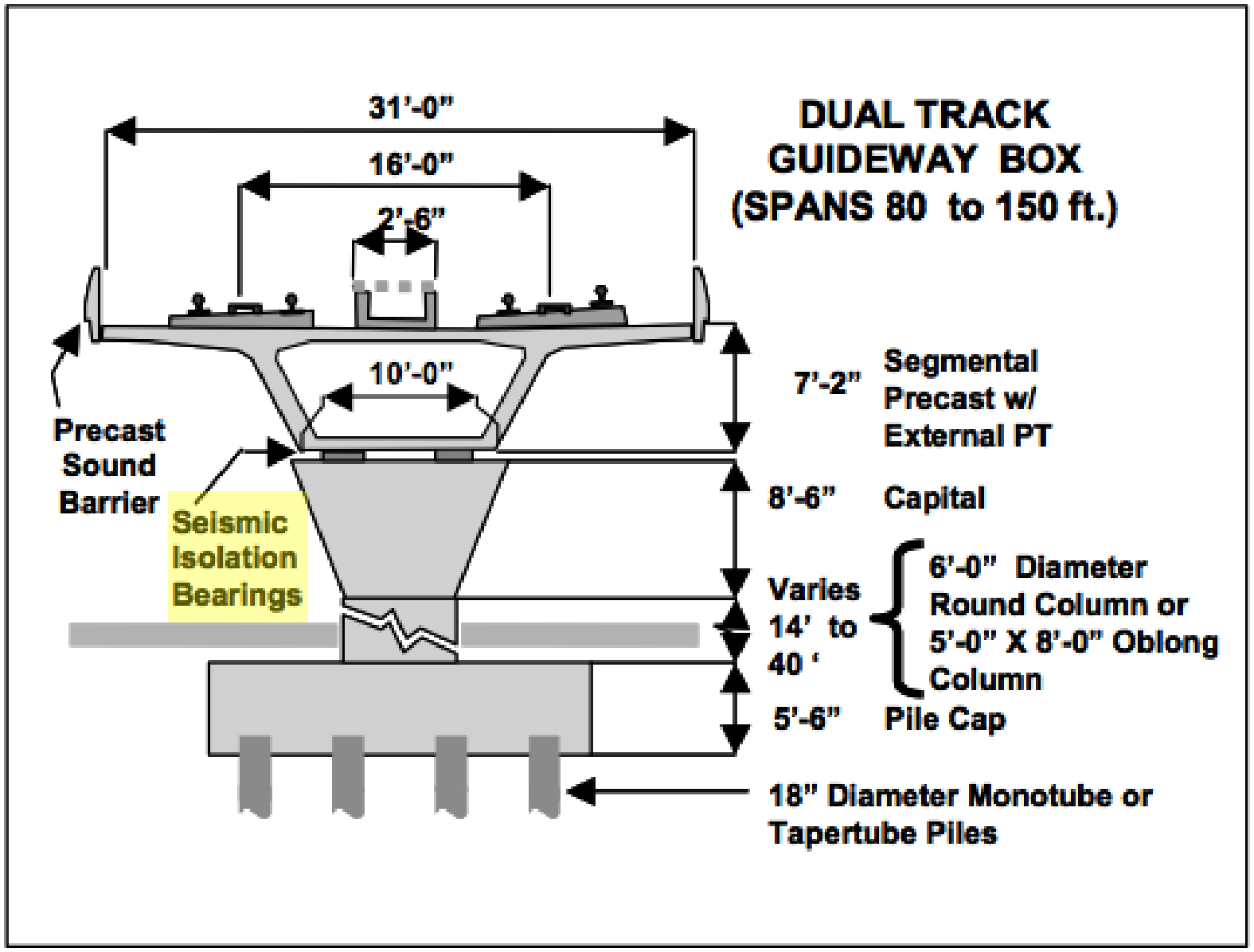
Lead Rubber Bearings (LRB)

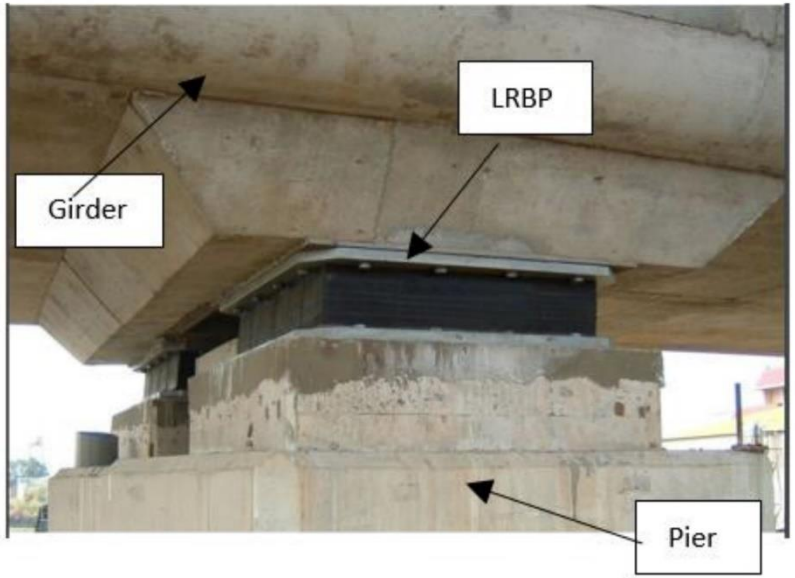
High-Damping Rubber Bearings (HDRB)

Seismic Base Isolation – Buildings



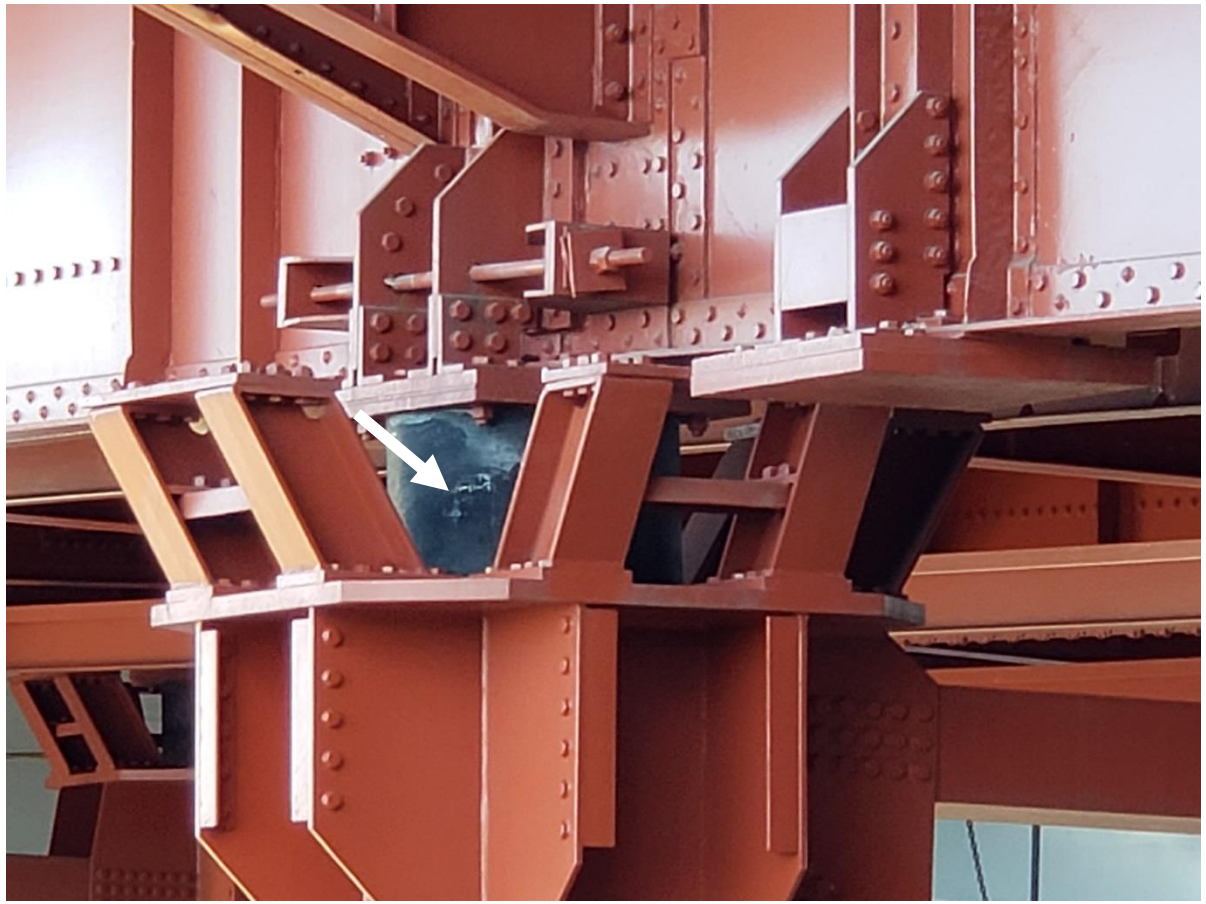
Seismic Base Isolation – Bridges



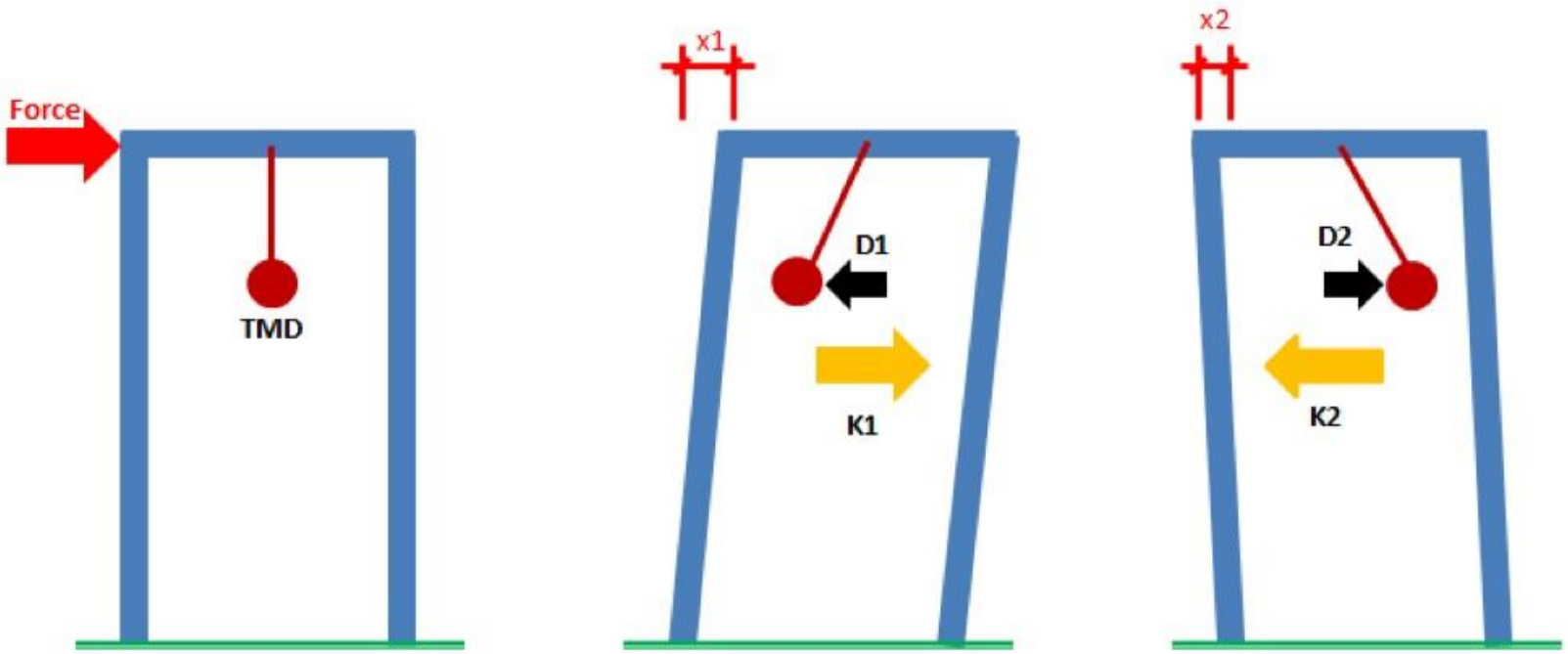


Golden Gate Bridge - Built in 1933 without Seismic Isolation

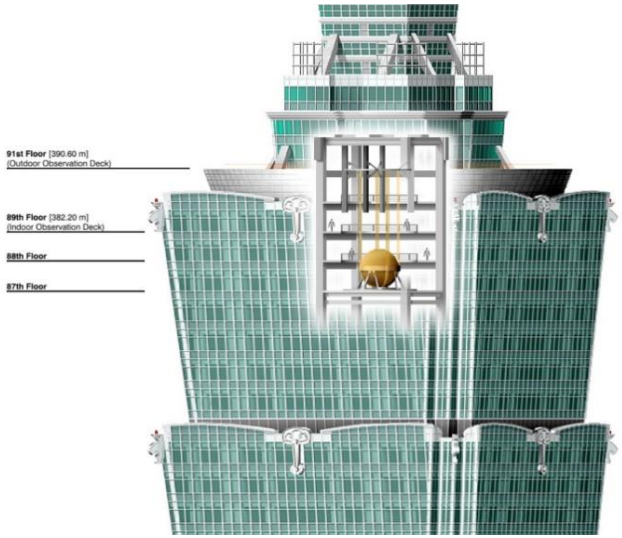
Retrofitting the Golden Gate Bridge with Seismic Isolation

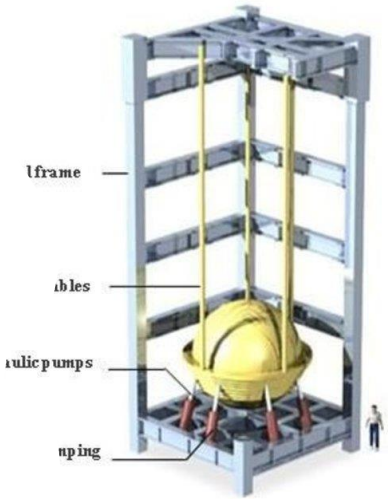


Energy dissipation dampers – Tuned Mass Dampers (TMD)

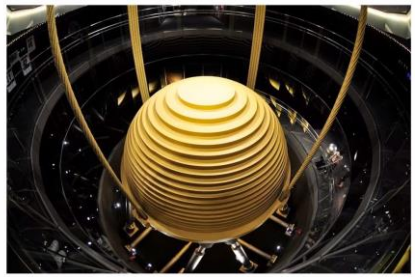


Building with TMD



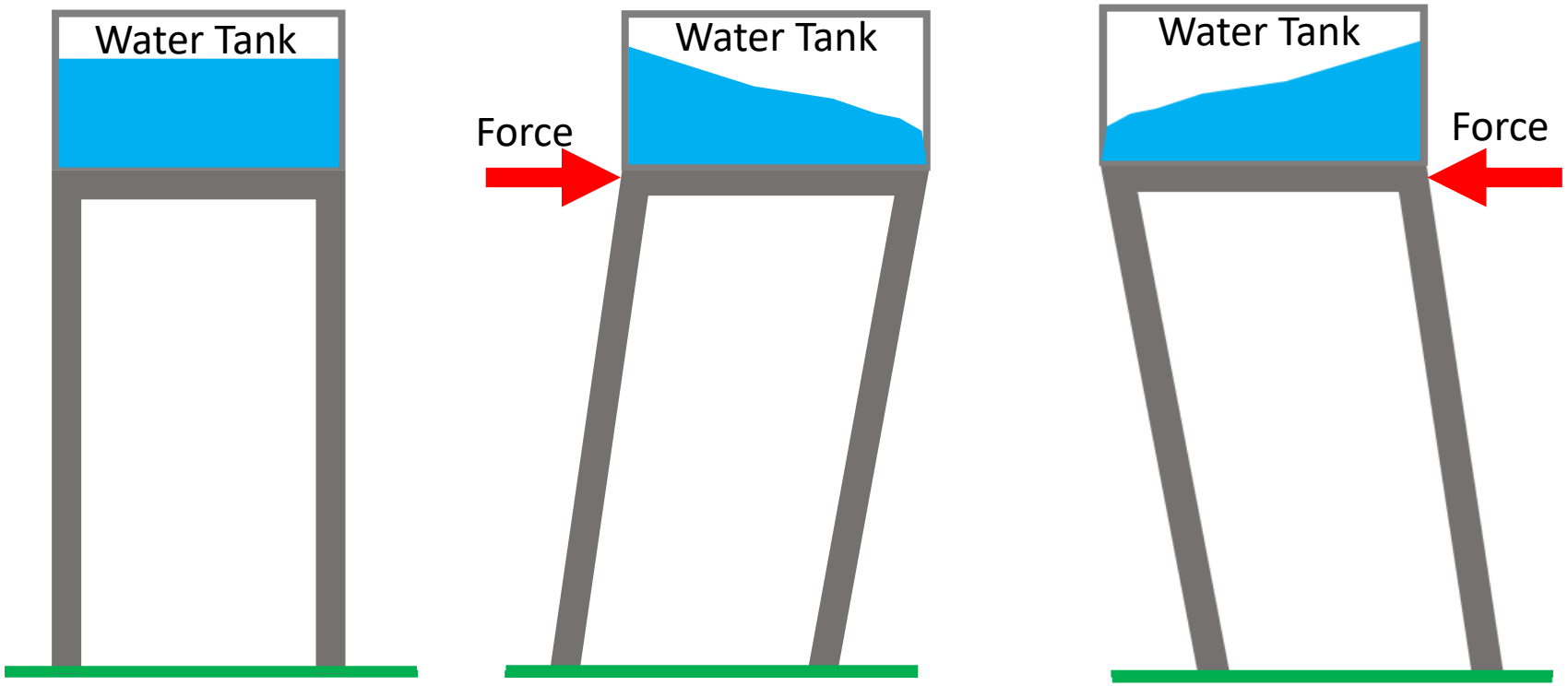


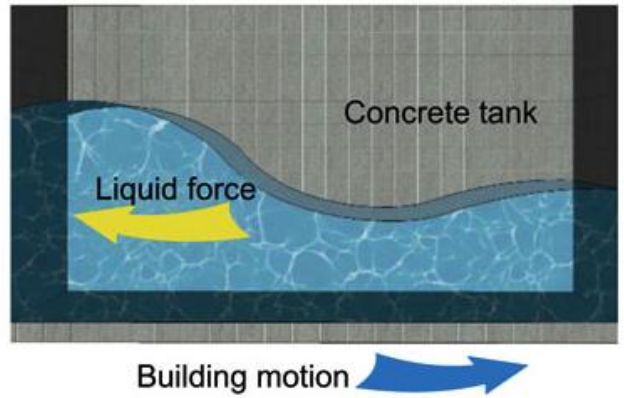
Taipei 101 TMD



Energy dissipation dampers – Tuned Liquid Dampers (TLD)

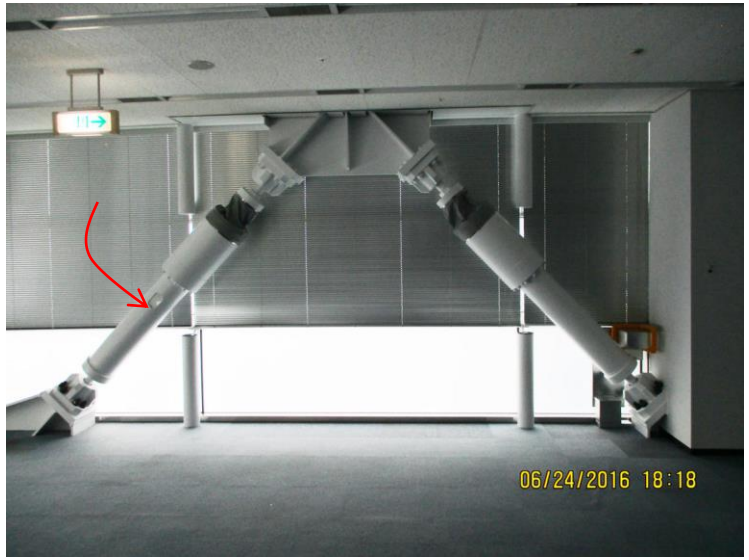
- Tuned Liquid Dampers is a tank filled with liquid that relies on the sloshing of the liquid to dissipate vibration energy
- Advantages: low cost, ease of installation and infrequent need for maintenance.
- TLD can be applied to almost any type of structure (high-rise buildings, towers and chimneys, including an existing structure
- The water tank is designed to have a natural frequency similar to that of the structure that needs to be controlled, and Resonance occurs based on this principle.
- The resultant sloshing of liquid inside the tank helps change the dynamic characteristics of the structure.
- The liquid pressure inside the TLD acts on the tank wall and swings the building back to its original equilibrium position.
- If the tank is tuned properly, it can reduce the peak response of structures subjected to seismic forces.
- The mass and frequency of the tank including its water, walls, roof, beams and columns were tuned to the optimized values.



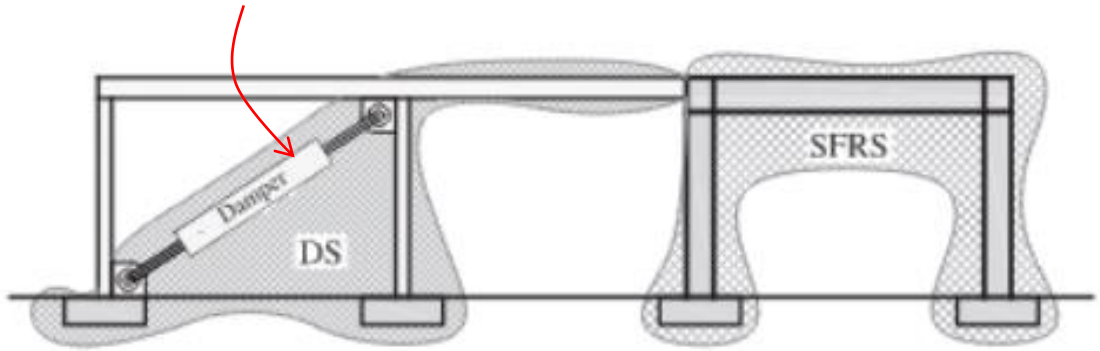


Energy dissipation - viscous dampers

- Viscous dampers have been widely used to mitigate the effects of earthquakes
- Viscous dampers are used where seismic isolation is not suitable (for example very tall, slender structures).
- Used in retrofitting of existing buildings and bridges.



Shock Absorbers



Damping devices

Carbon Fiber Reinforced Polymer (CFRP)

CFRP is used to improve the ductility of the structural members and provide earthquake-resistant reinforcement

Using CFRP before the Earthquake:
To strengthen existing buildings to meet the requirements of current seismic codes

Using CFRP after the Earthquake:
To repair buildings that have not been marked for demolition

Prescriptive Codes

and

Performance-Based Seismic Design

Prescriptive Codes vs. Performance-Based Seismic Design (PBSD)

“In case you build a new house, you must also **make a parapet** for your roof, that you may not place bloodguilt upon your house because someone **falling might fall from it**”

Prescriptive Codes

Performance Based Design

Prescriptive Codes vs. Performance-Based Seismic Design (PBSD)

Prescriptive Codes: restrict and discourage innovation

Performance Based Design: encourage innovation

Performance-Based Seismic Design (PBSD)

PBSD of buildings **meet the *intent* and *performance objectives* of the building code** but are designed using a **more rigorous approach that increases building performance reliability** and enhances architectural flexibility.

PBSD uses advanced design methods that meet the intent and performance objectives of the Building Code without relying on Code-prescriptive design provisions. Simulations are performed to analyze the predicted building performance, more rigorously than required by code.

Using PBSD methodology, engineers analyze the modeled building performance then specify elements of strength and stiffness exactly where they are needed and eliminate them where they are not, to more precisely allocate load-resisting structural elements.

PBSD of high-rise buildings is a methodology that is transforming the structural design of high-rise buildings in earthquake-prone regions.

PBSD modeling allows engineers to pinpoint the need for structural elements and eliminate them when they are not required.

Through application of sophisticated nonlinear time history analysis —practical only recently due to advancements in computer systems and programs— engineers can more reliably and directly predict building response during a maximum ground shaking event. The structure's design is then "tuned" and optimized to respond in the most efficient way possible. "Tuning" a structure starts with sophisticated analysis to predict how a structure will react to ground shaking.

In addition to analytic advancements, engineers lead the development of improved construction details through laboratory testing of full-scale building subassemblies to validate the new ideas or techniques. This has enhanced the industry's understanding of building element response under varying earthquake demand levels.

PBSD allows for cost-saving and better understanding of the building's performance

Prescriptive Codes vs. Performance-Based Seismic Design (PBSD)

Prescriptive Codes

The code specifies design requirements and detail.

Example: reinforcement detail for beams in a seismic zone. The designed uses this uses for all beams

Performance Based Design

PBD has flexibility and encourage innovation to improve safety and reduce cost

Example: For the beam detail in a seismic zone: PBD investigate the following

. What it gained if the stirrups spacing is reduced by x inches
. What it lost if the stirrups spacing is increased by x inches
. Do we need to use the code-specified detail for all beams
. Are the previous buildings (built with old codes) safe, and what is needed to bring them up to current codes.

PBD can be applied to any type of loads, but it was developed for earthquake loads

Performance-Based Seismic Design (PBSD) – Evaluation of Existing Buildings

PBSD provide means for existing structures to meet the new or the original **design objectives**, without the need to confirm to a **specific version of the codes**

Brittle Design

vs.

Ductile Design

Ductile vs. Brittle Materials

Ductility: Ability of the structure to absorb energy by inelastic deformation

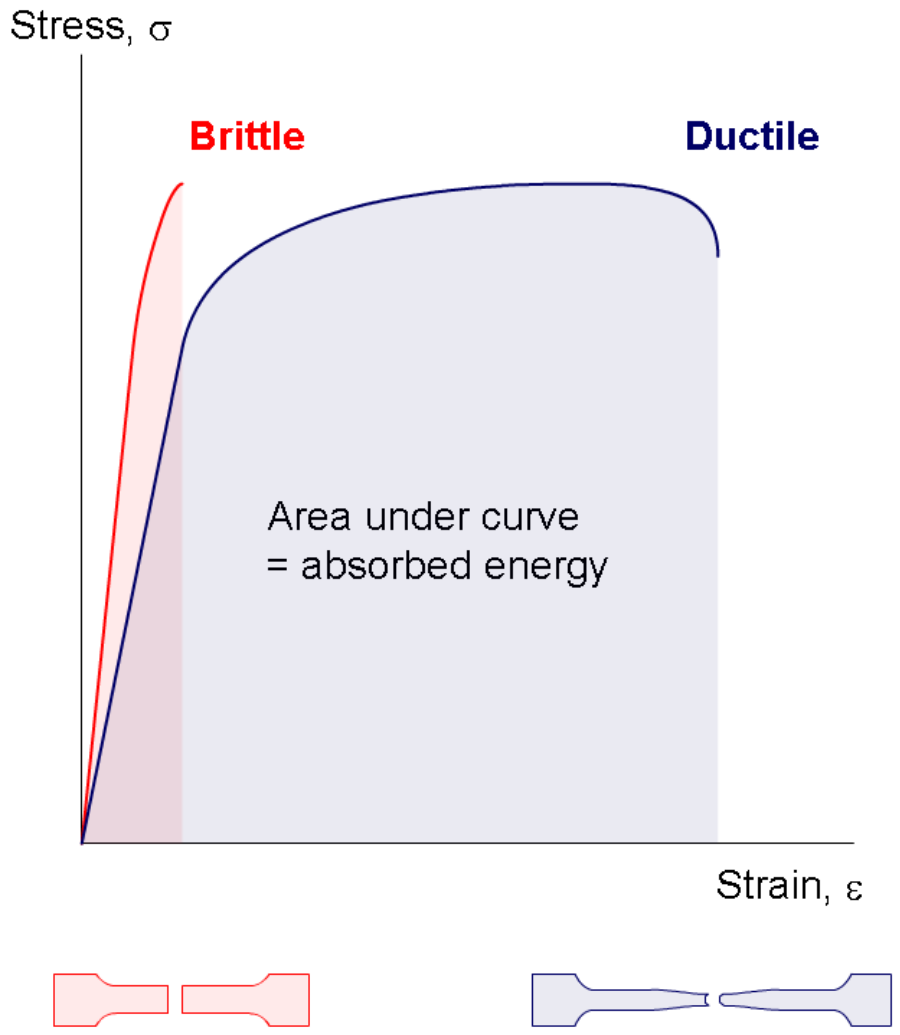
Ductile behavior during Earthquake:

- The structure will absorb the energy
- The structure may develop plastic hinges (permanent displacement with strong earthquake)

To assure that the structure has a Ductile behavior during Earthquake:

- Design the structure to be ductile
- Provide details of the reinforcement, especially at the joints

To ensure that the Building fails in a ductile mode, Building Codes limits the maximum percentage of reinforcement, specify specific reinforcement details, and require the structure to be designed for specific earthquake load.



ACI318 Design Details for Ductile Building Behaviors – examples from the Code

Section R4.10.1.1: "it is the intent of the structural integrity requirements to **improve redundancy and ductility through detailing of reinforcement and connections** so that, in the event of damage to a major supporting element or abnormal loading, the resulting damage will be localized and the structure will have a higher probability of maintaining overall stability"

Section R9.6.3.1: "Shear reinforcement restrains the growth of inclined cracking so that **ductility** of the beam is improved, and warning of failure is provided"

Section R9.7.3.8.2: "at the support, at least 1/4th of the max. positive moment reinforcement shall be extended along the beam bottom in to the support at least 6 inch…" ……. "this is required for the beams that are part of the primary lateral-load-resisting system to provide **ductility** in the event of moment reversal"

Section R14.1.5: "Plain concrete shall not be permitted for columns and pile caps, because it lacks the necessary **ductility** that columns should possess"

Section R25.7.3.3: The Spiral reinforcement ratio (ρ_s) shall satisfy the following requirement: $\rho_s \geq 0.45\left(\frac{A_g}{A_{ch}} - 1\right)\frac{f'_c}{f_{yt}}$

Columns meeting this requirement will exhibit considerable toughness and **ductility**

Section R1.1: A direct way of assuring a **ductile failure** mode is by limiting the amount of tension steel to not more that 75% of the balance condition, i.e. $\mathbf{0.75}\boldsymbol{\rho_b}$

Codes – Earthquake Design

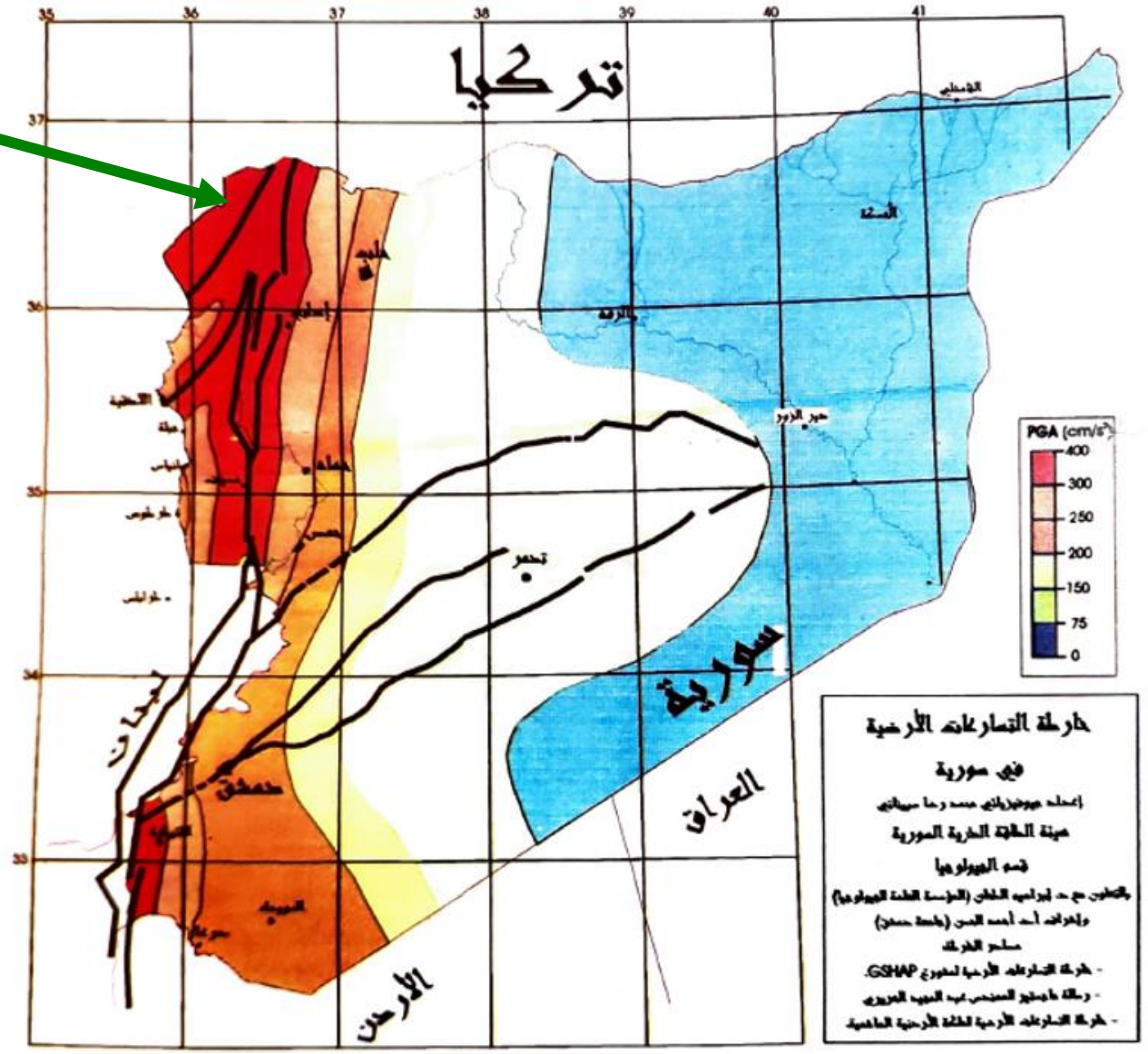
Turkiye-Syria Earthquake – Building Codes

. code-specified acceleration = 400 cm/sec^2 = 0.41g
. 2023 earthquake acceleration > 1.0g

1977 – Syrian code for design of RC Structures:
Earthquake provision: Only 4 pages

1980 – Summary if Syrian code for design of RC Structures: Earthquake provision: 0 pages

2004 – Syrian code for design of RC Structures:
Earthquake provision: Only 11 pages



Appendix D – 2004 Syrian code for design of RC Structures

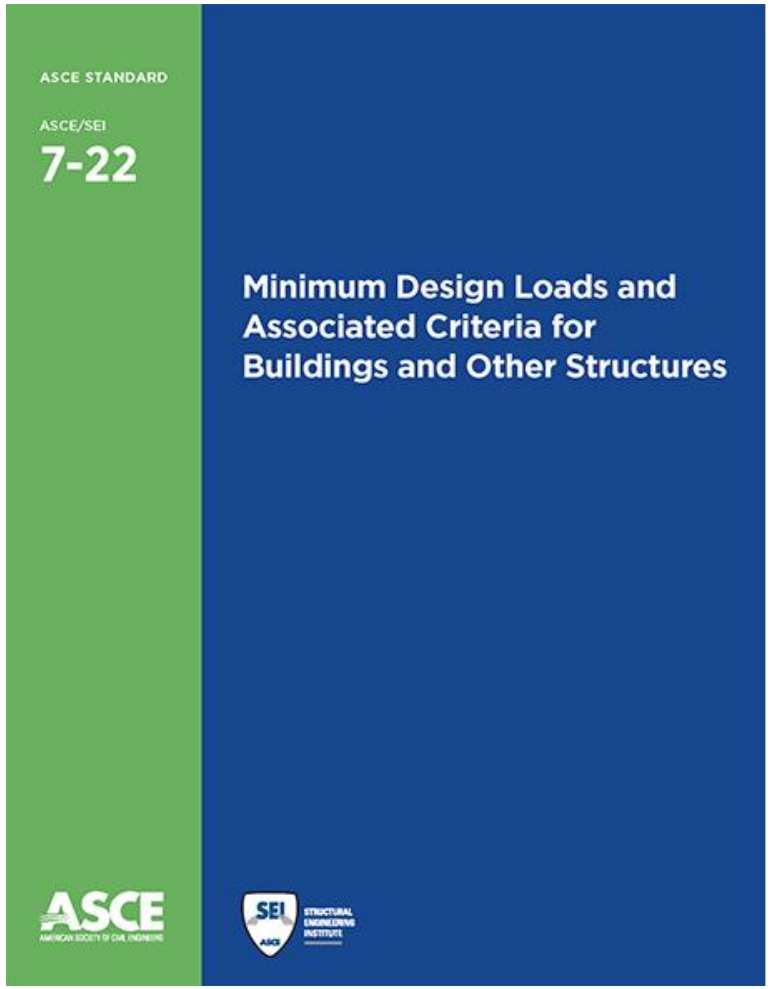
Structural Design Standards

SECTION 1613 EARTHQUAKE LOADS

1613.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions **in accordance with ASCE 7**, excluding Chapter l4 and Appendix 11A. The seismic design category for a structure is permitted to be determined in accordance with Section1613 or ASCE 7.

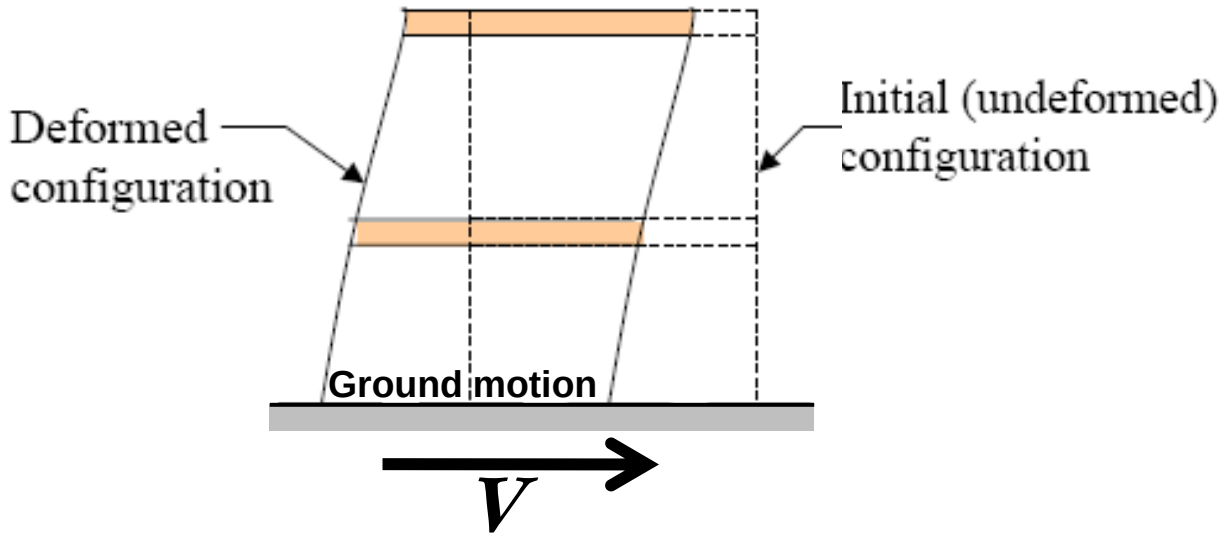
Structural Design Standards

ASCE 7



Over 360 pages of earthquake-related provisions and Commentary

Earthquake Loads – ASCE 7



$$V = C_s W \quad \text{(Kips)}$$

Newton's second law of motion

F = m a

Where:

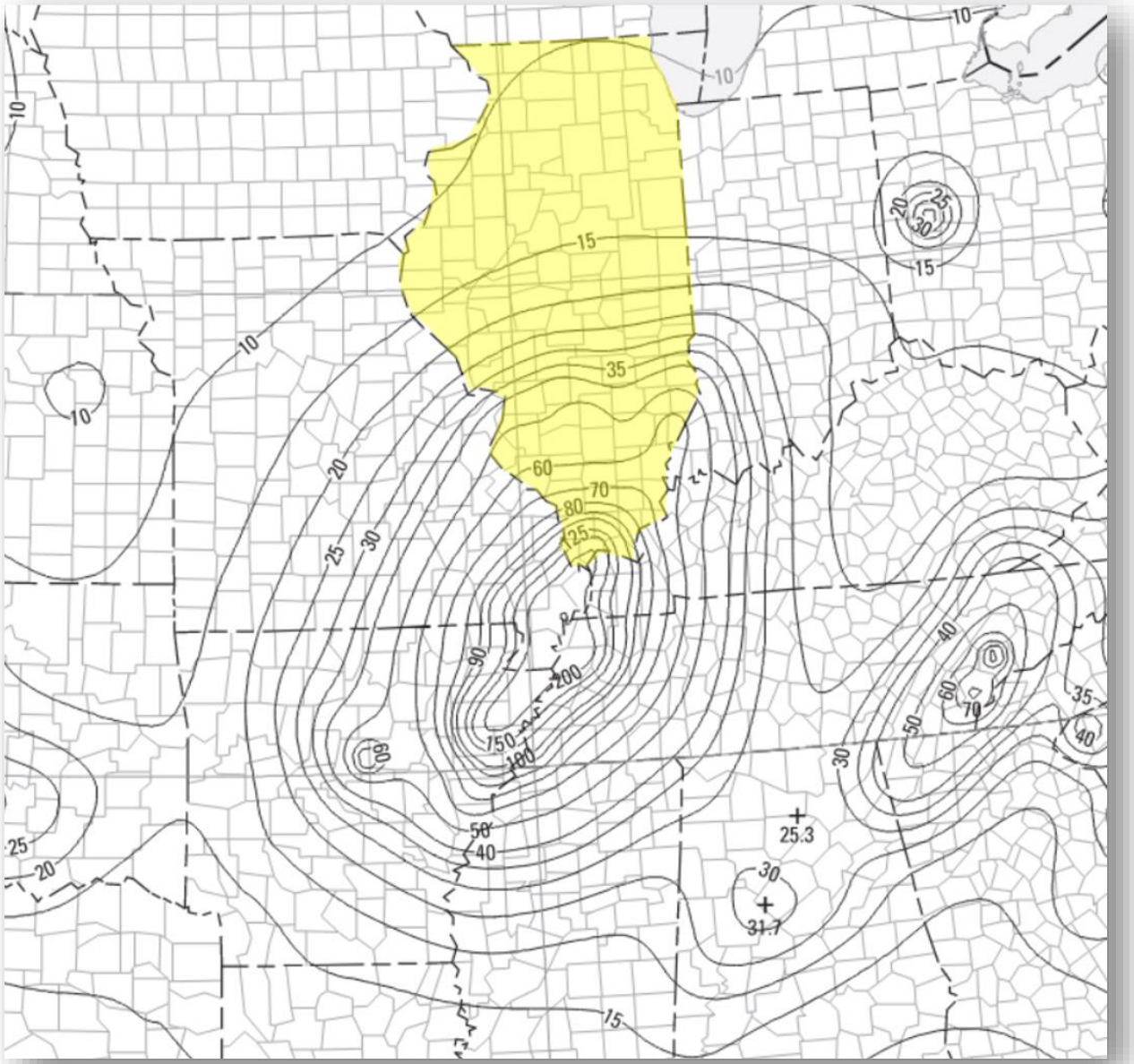
$\mathbf{V}$ = seismic base shear

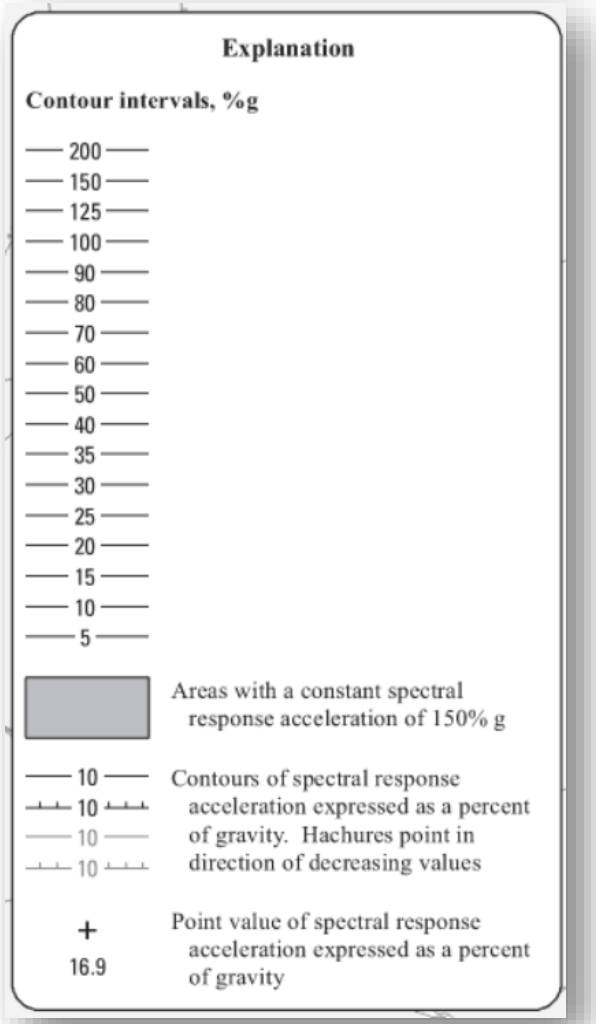
C_s = response coeficient = $\dfrac{S_{DS}}{\left(R/I_e\right)}$

W = building weight

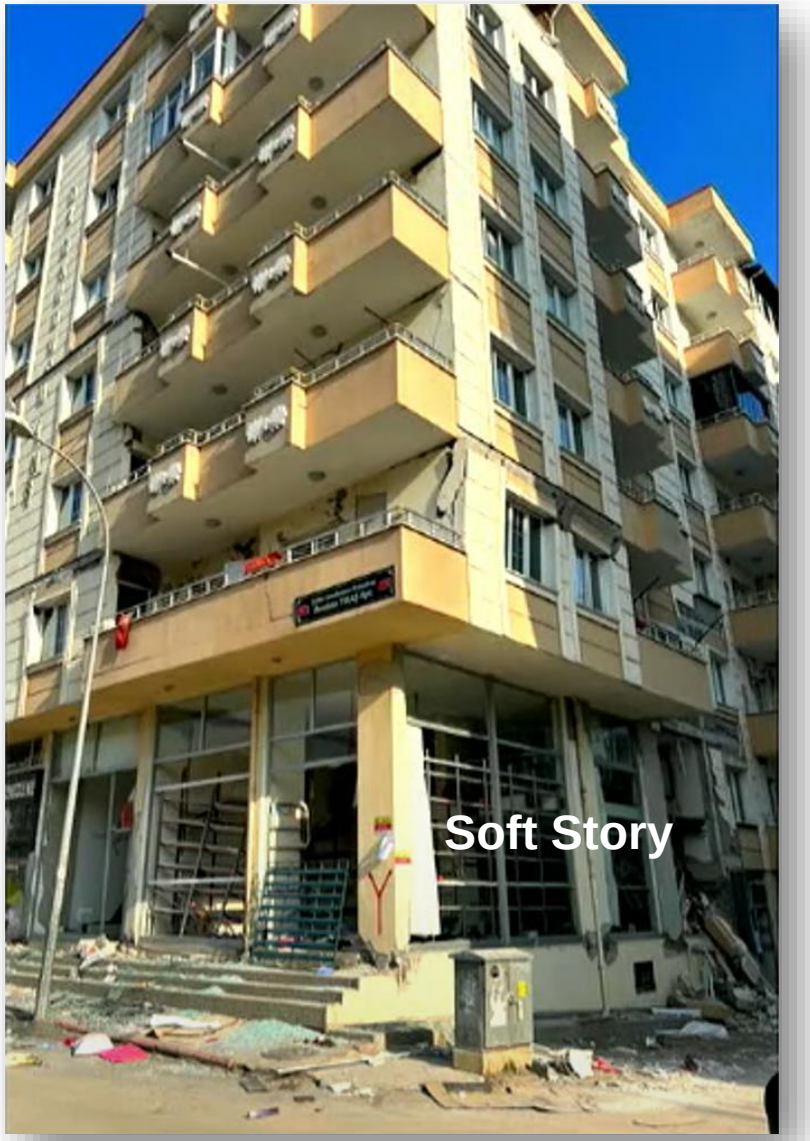
Earthquake Loads – ASCE 7

FIGURE 22-1 of ASCE-7
S_S Risk-Targeted Maximum Considered Earthquake (MCER) Ground Motion Parameter





Horizontal Structural Irregularities – Soft Story



Soft Story – ASCE 7

Stiffness–Soft Story Irregularity:

Stiffness–soft story irregularity is defined to exist where there is:

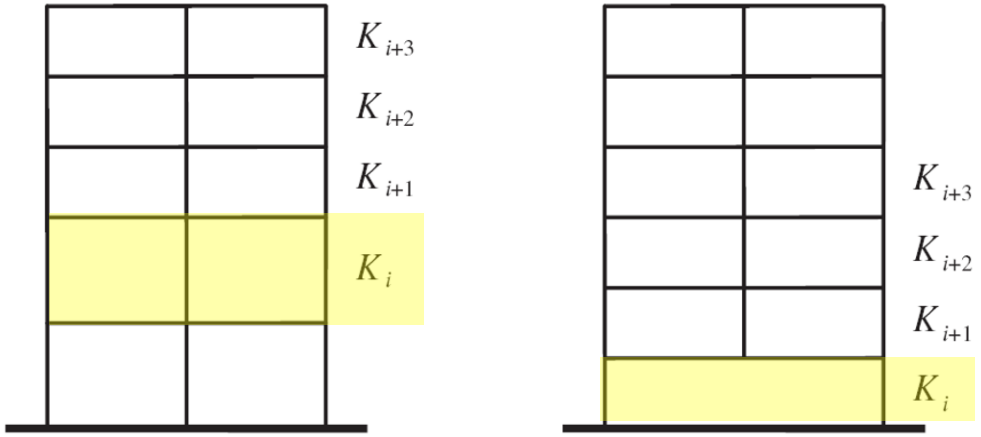
- a story in which the lateral stiffness is less than 70% of that in the story above:

$$K_i < 0.7K_{i+1}$$

Or

- a story in which the lateral stiffness is than 80% of the average stiffness of the three stories above:

$$K_i < 0.8\,\frac{(K_{i+1} + K_{i+2} + K_{i+3})}{3}$$



Type 1. Irregularity (Stiffness) – Soft Story

NAAAEA-Related Items

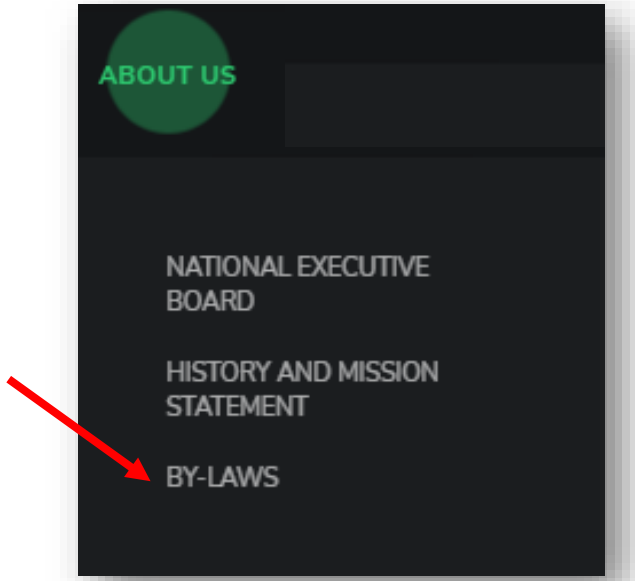
NAAAEA Mission

NAAAEA Mission Statement

NAAAEA is a professional Arab American association dedicated to help, strengthen, empower and inspire its members for excellence. NAAAEA promotes and advocates the Arab American Engineers, Architects and Information Technology professionals in the United States, by providing career and educational enhancement programs, technical exchange, fellowship, and community service. NAAAEA is a non-profit, non-political and non-religious Professional Association.

For more information, see the NAAAEA Bylaws (https://nationalaaaea.org/)
On the "ABOUT US" tab

Screen shot from the Website



Announcements

Announcements

National AAAEA Scholarship
Application deadline: **October 15, 2023.**
Apply at https://nationalaaaea.org/scholarship-application/

Grant for Students Initiatives
This NAAAEA Grant Program has been developed to assist AAAEA students to advance their initiatives into the application stage.
Apply at https://nationalaaaea.org/grant-for-student-initiatives/

Grant for NAAAEA Chapters
This NAAAEA Grant Program has been developed to assist to assist the local chapters in growing and promoting their activities. Apply at https://nationalaaaea.org/grant-program/

Outstanding Student Award
Apply or Nominate others. See website https://nationalaaaea.org/grant-program/ for more details

Outstanding Young Engineer Award
Apply or Nominate others. See website https://nationalaaaea.org/grant-program/ for more details

NAAAEA Resources:

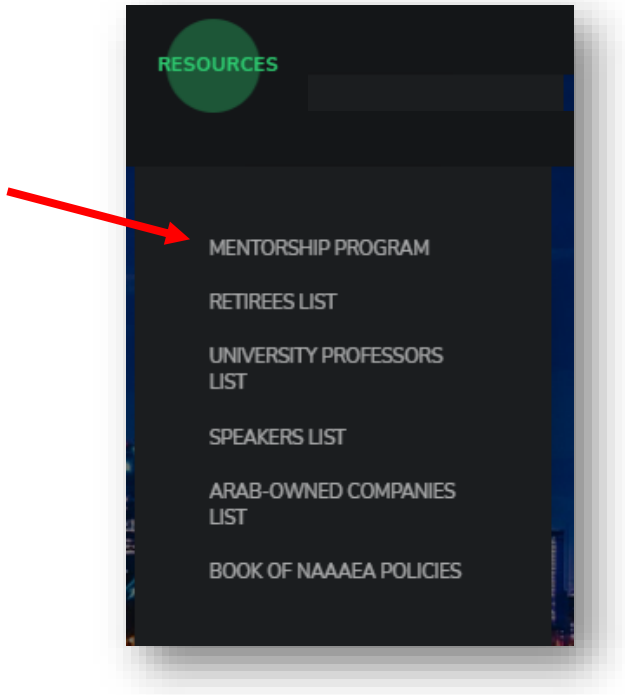
Mentorship Program

Mentorship Program

The purpose of the NAAAEA **Mentorship Program** is to gather names of members who are interested in becoming a mentor to students and to those in the professional practice.

If you are interested in volunteering in the Mentorship Program, please visit https://nationalaaaea.org/ and enter your information the "Resources" tab.

Screen shot from the Website



NAAAEA Resources:

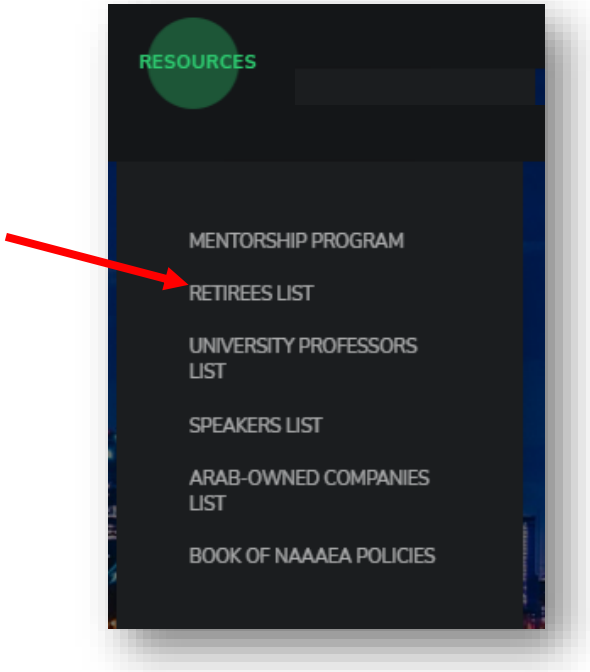
Retirees List

Retirees List

The purpose of the NAAAEA **Retiree List** is to gather names of members who are interested in becoming a mentors to students. The list will also serve as a Resource to those who are in the professional practice.

If you are interested in adding you name to the Retiree List, please visit https://nationalaaaea.org/ and enter your information the "Resources" tab.

Screen shot from the Website



NAAAEA Resources:

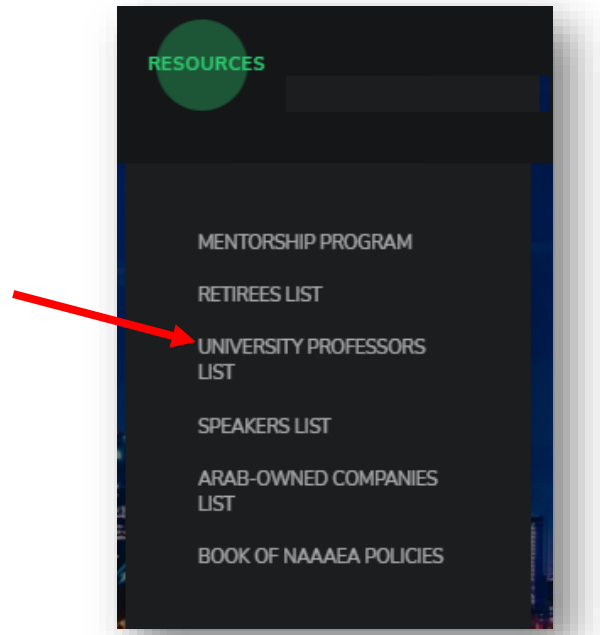
University Professors List

University Professors List

The purpose of the NAAAEA **University Professors List** is to gather the names of Arab Professors. The goal is to foster future cooperation among the professors on the list.

If you are interested in adding you name to the University Professors List , please visit https://nationalaaaea.org/ and enter your information the "Resources" tab.

Screen shot from the Website



NAAAEA Resources:

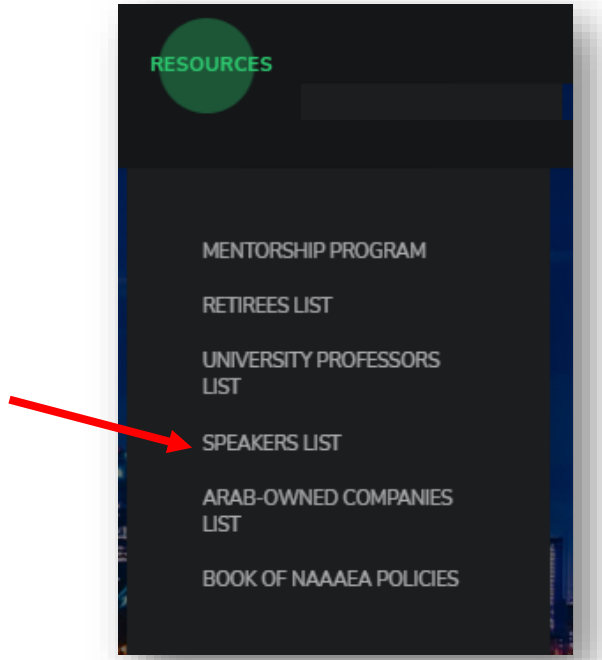
Speakers List

Speakers List

The purpose of the NAAAEA **Speakers List** is to gather names of Arab speakers who are willing to present their areas of expertise in webinars and conferences.

If you are interested in adding you name to the Speakers List , please visit https://nationalaaaea.org/ and enter your information the “Resources” tab.

Screen shot from the Website



NAAAEA Resources:

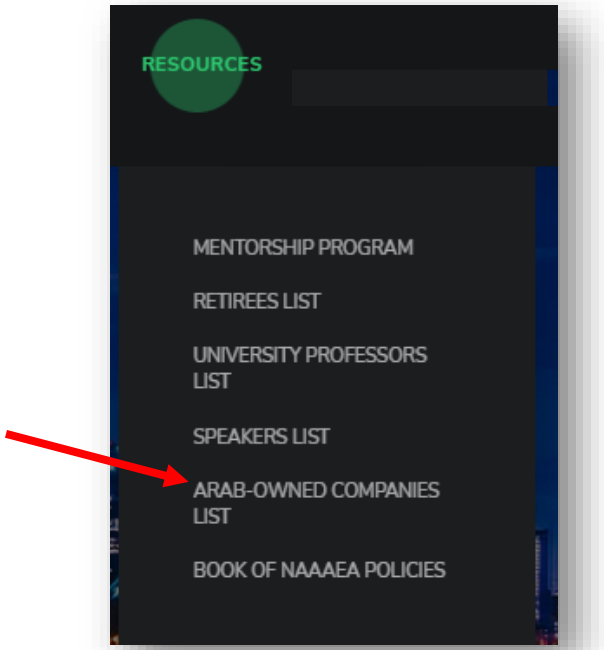
Arab-Owned Companied List

Arab-Owned Companies List

The purpose of the **Arab-Owned Companies List** is to foster cooperation among the owner of the companies.

If you are interested in adding you company name to the Arab-Owned Companies List, please visit https://nationalaaaea.org/ and enter the information in the "Resources" tab.

Screen shot from the Website



NAAAEA Resources:

Book of NAAAEA Policies

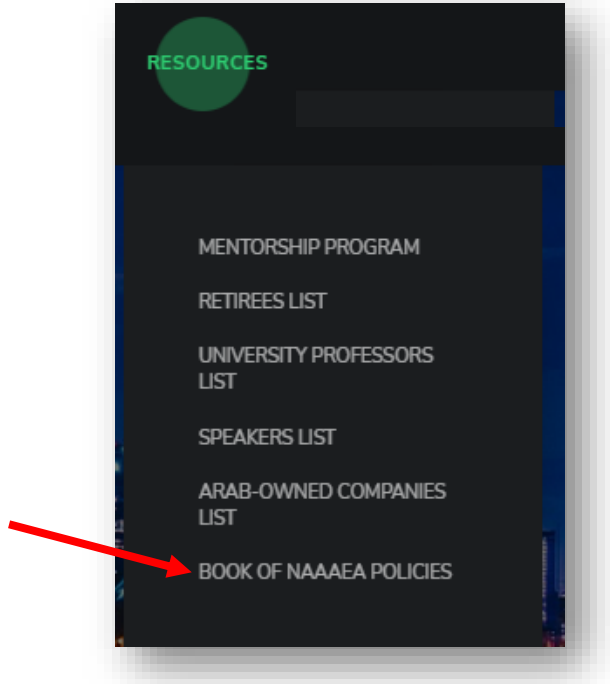
Book of NAAAEA Policies

The purpose of the **Book of NAAAEA Policies** is to provide these policies as a template for the chapters to use if they wish to use any of them.

See https://nationalaaaea.org/ website under “RESOURCES”.

If your Chapter is interested in a specific policy that is not currently on NAAAEA website, please contact NAAAEA (https://nationalaaaea.org/contact-us/) to prepare the policy and share with all Chapters to use.

Screen shot from the Website



Educational Resources

Educational Resources

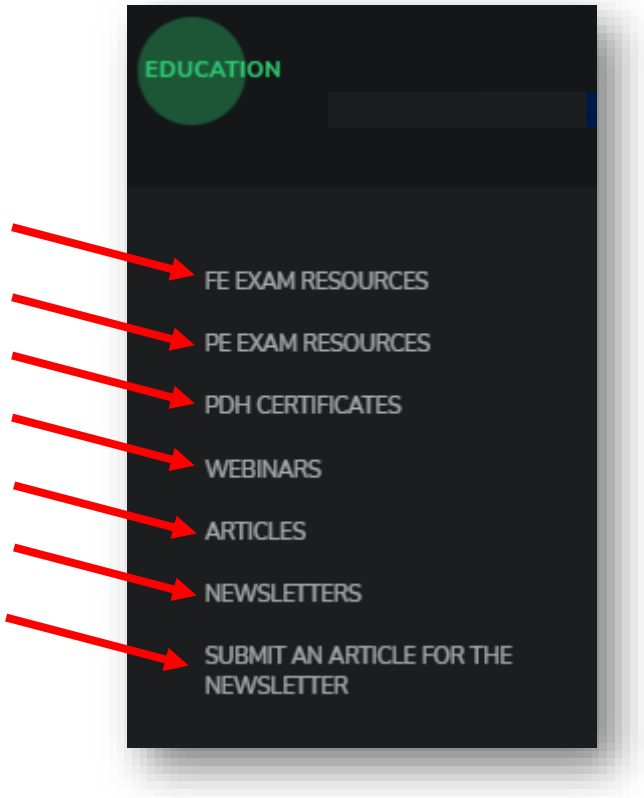
NAAAEA has various educational-related resources. See https://nationalaaaea.org/ website under "EDUCATION" tab.

The current Educational Resources include:

- FE Exam Resources
- PE Exam Resources
- PDH Certificates
- Webinars
- Articles
- Newsletters
- Submit an Article for the Newsletter

If your Chapter is interested in a specific educational materials (classes, webinar, PDH topics, etc.) that are not currently on NAAAEA website, please contact NAAAEA (https://nationalaaaea.org/contact-us/) to prepare the materials and share with all Chapters.

Screen shot from the Website



Grant for NAAAEA Chapters

Grant for NAAAEA Chapters

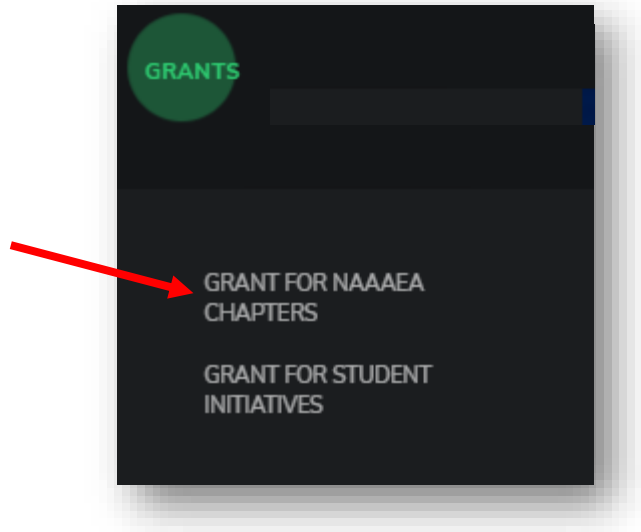
The NAAAEA Grant Program has been developed to assist the **chapters** in growing and promoting their activities.

Eligibility
All NAAAEA chapters are eligible to submit a grant application.

Amount of the Grant
Specify the amount you are requesting for the program or the project. Provide a brief break down of the requested amount. NAAAEA will award grant(s) based on the availability of funds.

Apply at
https://nationalaaaea.org/grant-program/

Screen shot from the Website



Grant for
Student Initiatives

Grant for Students Initiatives

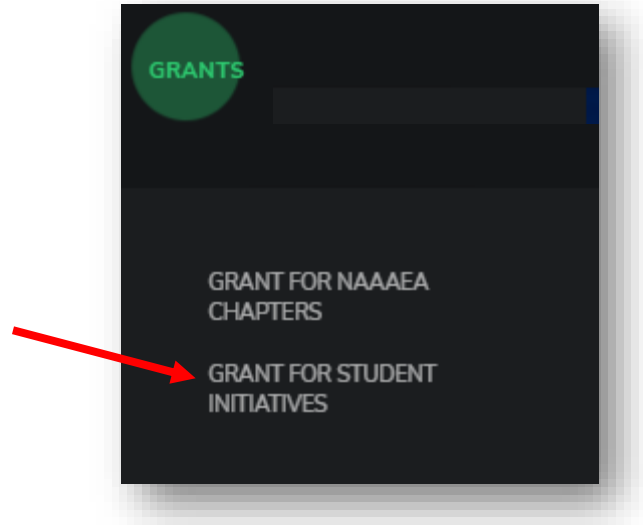
This NAAAEA Grant Program has been developed to assist **AAAEA students** to advance their initiatives into the application stage.

Eligibility
All NAAAEA chapter Students are eligible to submit a grant application.

Amount of The Grant
Specify the amount you are requesting for the program or the project. Provide a brief breakdown of the requested amount. NAAAEA will award grant(s) based on the availability of funds

Apply at:
https://nationalaaaea.org/grant-for-student-initiatives/

Screen shot from the Website



NAAAEA Scholarship

NAAAEA Scholarship

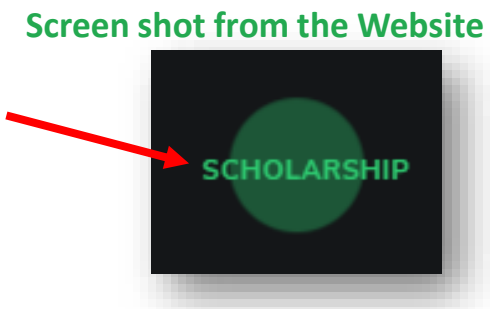
The NAAAEA scholarship was established by the National AAAEA and is presented to an Undergraduate or Graduate students in the areas of Engineering, Architecture, and Computer Science.

AMOUNT
At least one scholarship will be awarded annually in an estimated amount of at least $1,000.

ELIGIBILITY REQUIREMENTS
The NAAAEA scholarship is available to student members of who are attending an accredited university in the USA and must be a student-member in any one of the NAAAEA Chapters.

Apply at:
https://nationalaaaea.org/scholarship-application/
Application deadline: October 15, 2023

Screen shot from the Website



Career Center

Career Center

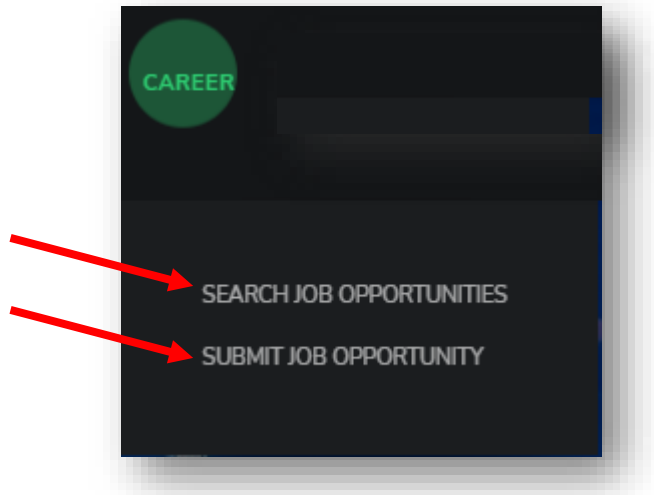
The National Career Center is one of the NAAAEA programs that strive to provide the members with services, programs, and resources to advance their career to the next level.

This tab include:

- **Search for Opportunity,** and
- **Submit Job Opportunity**

See https://nationalaaaea.org/ website under "CAREER".

Screen shot from the Website



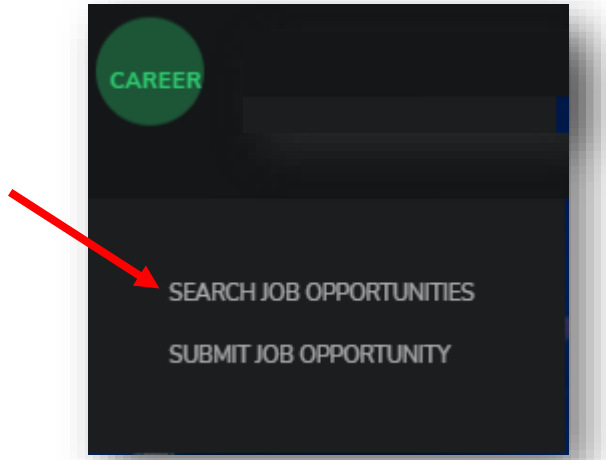
Career Center – Quick process to find Job announcement in our website

Career Center

Career Opportunities Nationwide

- ENGINEERING MANAGER - INFRASTRUCTURES PROGRAM - RIYADH, KSA
- CLAIMS MANAGER - INFRASTRUCTURES PROGRAM - RIYADH, KSA
- RISK MANAGER - INFRASTRUCTURES PROGRAM - RIYADH, KSA
- COMMERICAL MANAGER - RIYADH, KSA
- CONTRACTS MANAGER - RIYADH, KSA
- MECHANICAL ENGINEER - HRESOURCE@DEG-AMERICA.COM
- JUNIOR ENGINEER, TECHNICIAN - HRESOURCE@DEG-AMERICA.COM
- STRUCTURAL DESIGNER - HRESOURCE@DEG-AMERICA.COM
- ELECTRICAL ENGINEER, PE - HRESOURCE@DEG-AMERICA.COM
- CIVIL TRANSPORTATION ENGINEER - HRESOURCE@DEG-AMERICA.COM
- SURVEYING ENGINEERING TECHNICIAN III - NCDOT - RALEIGH, NC
- PHOTOGRAMMETRY ENGINEERING TECHNICIAN III - NCDOT - RALEIGH, NC

Screen shot from the Website



See https://nationalaaaea.org/ website under “CAREER”.

Career Center – Quick process to submit your Companies' Job announcement to our website

Career Center

CAREERS - SUBMIT OPPORTUNITY

BACK TO CAREER CENTER

Career Center Disclaimer

- Applicants posting jobs agree to follow truth in posting. Posted information must be true and genuine.
- Applicants agree to follow the law of the land, all professional & business ethics.
- National AAAEA is not responsible for the content of the job posting. National AAAEA is only a facilitator. For more information contact the job contact directly.
- Applicants agree to indemnify & hold harmless the organization, its board members, and committee members form all and any liabilities associated with their advertisement or posting.

Questions?

Please feel free to forward us any questions to career@naaaea.org

Submit Your Job Opportunity

Your Full Name *

Your Email Address *

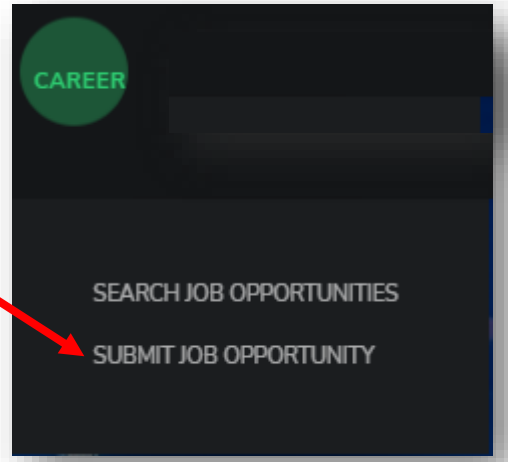
Job Name *

Job Website *

Location [City,State] *

SUBMIT JOB POST

Screen shot from the Website



See https://nationalaaaea.org/ website under "CAREER".

2023 NAAAEA Executive Board Monthly Meetings

Below is the 2023 schedule of the NAAAEA National Executive Board (NEB) Monthly Meetings. All are encouraged to contact us at https://nationalaaaaea.org/contact-us/ and show interest in **attending a board meeting.** The purpose of your attendance is to provide **feedback** to NAAAEA and let us know your **needs**.

2023 Schedule of NAAAEA Executive Board Monthly Meetings

#	Monthly Meeting from 7:00 pm to 8:00 pm CST (Last Thursday of the Month)
1	1/26/2023
2	2/23/2023
3	3/30/2023
4	4/27/2023
5	5/25/2023
6	6/29/203
7	7/27/2023
8	8/31/2023
9	9/28/2023
10	10/26/2023
11	11/30/2023 - Thanksgiving day
12	12/28/2023

2023 NAAAEA National Executive Board (NEB) names and Contacts

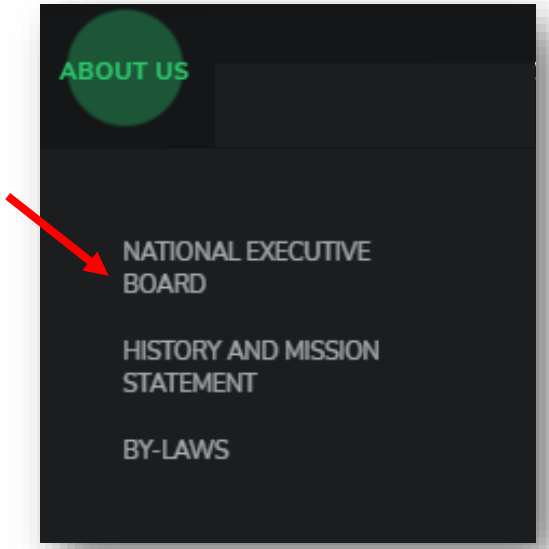
Contact us. Let us know **your needs**

2023 NAAAEA National Executive Board (NEB)

#	2023 NEB members	Chapter	NEB Position	Email
1	**Dr. Soliman Khudeira, PhD, SE, PE**	IL	President	Soliman.Khudeira@iit.edu
2	**Abder Rahman Ghouleh, PE**	IL	Vice President	arghouleh@gmail.com
3	**Nabih Hussein, PE**	TX/Houston	Secretary	nabihhussein@gmail.com
4	**Hussam Alkhatib, PE**	IL	Treasurer	hussam.alkhatib@graef-usa.com
5	**Rami Asfahani, PE**	IL	IT Committee Chair	ramiasfahani@gmail.com
6	**Nabil Khatib, EIT**	CO	Education Committee Chair	nabeal.khatib@yahoo.com

BOD	**Dr. Hosam Salman, PhD, PE**	TX	BOD Chair	Hosam.Salman@wsp.com

Screen shot from the Website



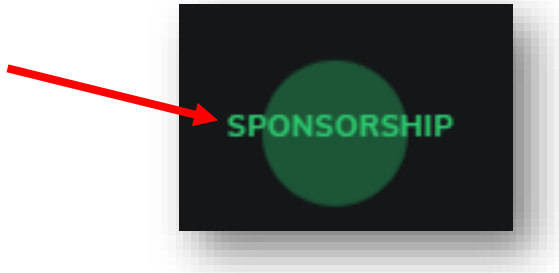
Sponsorship Opportunity

Sponsorship Opportunity

The National AAAEA (NAAAEA) is a non-profit organization, and it is IRS Tax Exempt under Section 501(c)(3).

NAAAEA has nine (9) Chapters in various States in the USA. NAAAEA and its Chapters have an impressive track record of technical seminars, E-newsletter, professional engineering conferences, social networking events, introduction to the Fundamentals of Engineering (FE) Exam, introduction to the Principles and Practice of Engineering (PE) Exam, introduction to the Structural Engineering (SE) License Exam, tutoring programs for the SAT and ACT tests for high school students, a scholarship program for college students, Grants for college student initiatives, and Awards to students and professionals programs.

Screen shot from the Website



Benefits of Sponsorship: Sponsorship benefits include:

- Your company logo & name will be displayed on the home page of the National AAAEA Website with an active link to your company website
- Your company logo & name will be included in the NAAAEA E-Newsletter
- You can advertise job postings on the NAAAEA website and thru email.
- Your company logo & name will be recognized and displayed at the annual NAAAEA National conference

Amount: $1000 – For a full year of benefits

Current NAAAEA Sponsors

Current NAAAEA Sponsors

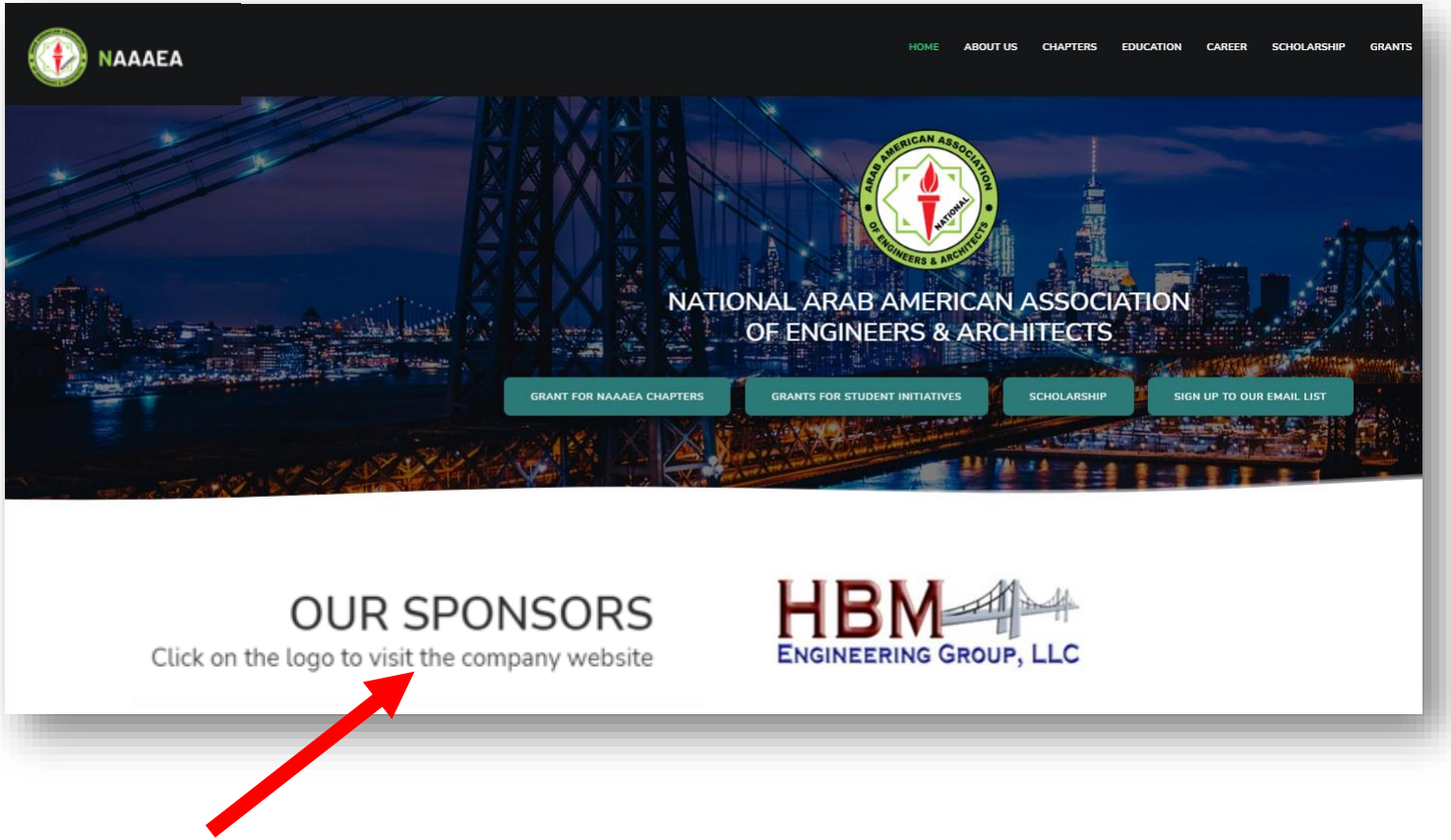
HBM Engineering Group, LLC
http://hbmengineering.com/

Terracon
https://www.terracon.com/

MILHEM Digital Transformation and Leadership
https://www.milhemdtl.com/

HVJ Associates
https://www.hvj.com/

Screen shot from the home page of the Website



Current NAAAEA Chapters

Current NAAAEA Chapters

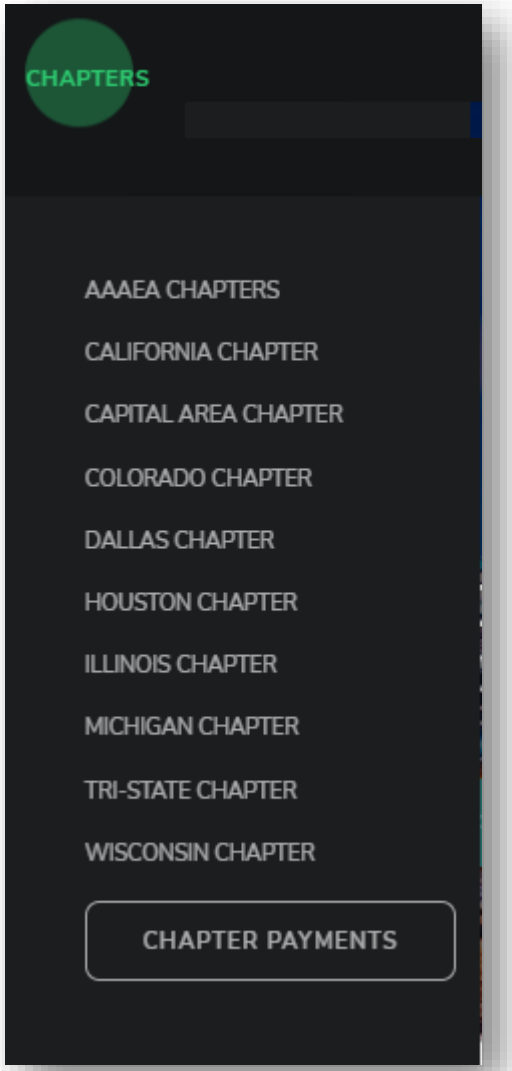
NAAAEA has currently nine Chapters listed below and shown on the map below.

Click below on the chapter link shown below to visit the Chapter's website.

- California Chapter
- Capital Area Chapter (DC, VA, MD)
- Colorado Chapter
- Dallas Chapter
- Houston Chapter
- Illinois Chapter
- Michigan Chapter
- Tri-State Chapter (NY, NJ, CT)
- Wisconsin Chapter

A link to each Chapter is also provided on NAAAEA website https://nationalaaaea.org/ under the "CHAPTERS" tab.

Screen shot from the Website



Interested in Forming a New NAAAEA Chapter?

Forming a New NAAAEA Chapter

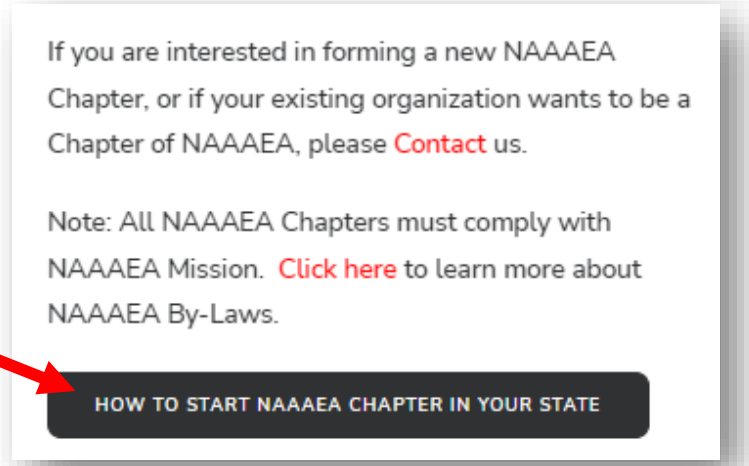
If you are interested in forming a new NAAAEA Chapter, or if your existing organization wants to be a Chapter of NAAAEA, please contact us at https://nationalaaaaea.org/contact-us/

Note: All NAAAEA Chapters must comply with NAAAEA By-Laws. Click here to learn more about NAAAEA By-Laws.

Click on the link below to download "**How to Start NAAAEA Chapter in Your State**":
https://nationalaaaaea.org/wp-content/uploads/2022/08/How-to-Start-an-NAAAEA-Chapter-in-your-State.pdf

Map showing the current NAAAEA nine chapters.
See https://nationalaaaaea.org/ website under the "CHAPTERS" tab for a link to each chapter website

Screen shot from the Website



Policy and Guideline on How to Start NAAAEA Chapter in your State

NAAAEA Resources:

Start a New Chapter

Follow the following steps and guidelines

1. Review the NAAAEA By-Laws. Specifically see "ARTICLE II – CHAPTERS, RULES AND REGULATIONS". The NAAAEA bylaws can be found online https://nationalaaaaea.org/ under the "ABOUT US" tab.
2. For a chapter to be formed, a group of at least 10 Arab American Engineers, Architects, or Information Technology professionals need to show interest in forming a chapter of NAAAEA (per Article II, Section 2 of the By-Laws)
3. The 10 professionals need to submit a petition to NAAAEA requesting to be recognized as a Chapter in their geographical area of the United States.
4. After NAAAEA approve the Chapter, the group needs to form a not-for-profit organization and register it in their State.
5. The group will need to apply for their own 501 (c)(3) designation from the Internal Revenue Service.

Other Action items:

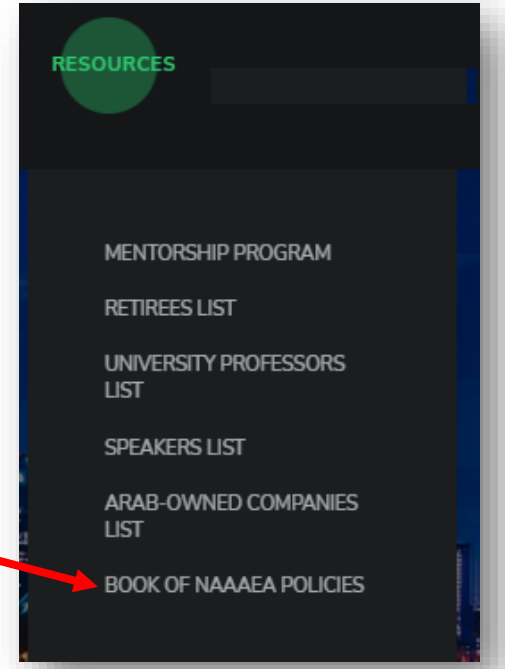
1. Elect officers from the group
2. Draft your own By-Laws (the National Board can assist)
3. Contact NAAAEA to provide you with your AAAEA State Logo
4. Establish a website (the National Board can assist)
5. Conduct monthly meetings
6. Establish Student Chapters in Universities in your state

NAAAEA Resources:

1. Visit https://nationalaaaaea.org/ web site and utilize the available resources
2. Contact NAAAEA for any of your needs
3. We can meet with your group or via Zoom or in person where possible to assist in your formation or to answer any questions

The Policy "How to start a Chapter" is available on the website https://nationalaaaaea.org in the "Chapters" tab

Screen shot from the Website



Outstanding Student Award

Awards:

Outstanding Student Award

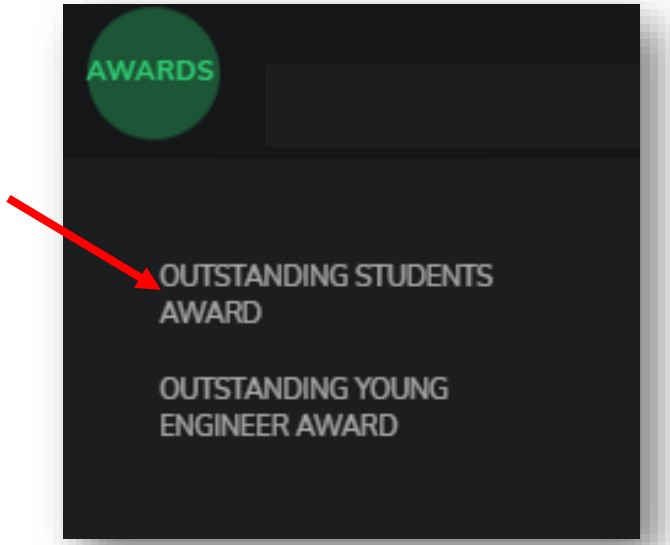
This NAAAEA **Outstanding Student Award** has been developed to encourage college students, who are members of any Chapter of NAAAEA, to be active with AAAEA and other professional associations, to volunteer their time with their community activities, and to be accomplished students at their university.

ELIGIBILITY

All AAAEA student members aged **35** or younger who is recognized by colleagues for his/her outstanding achievements, are eligible to submit for this award. Nomination could be by the applicant, or by others who are familiar with the applicant involvements and accomplishments

See https://nationalaaaea.org/ website under "AWARD" to apply for this Award or to nominate someone.

Screen shot from the Website



Awards:

Outstanding Young Engineer Award

Outstanding Young Engineer Award

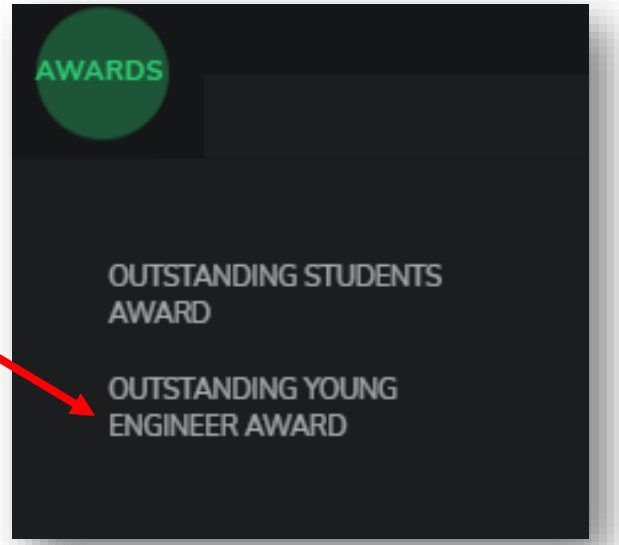
This NAAAEA **Outstanding Young Engineer Award** has been developed to encourage young AAAEA members to be active with AAAEA and other professional organizations, obtain professional licensed early in their career, and encourage volunteerism in community activities.

ELIGIBILITY

All AAAEA members aged **40** or younger who is recognized by colleagues for his/her outstanding achievements, are eligible to submit for this award. Nomination could be by the applicant, or by others who are familiar with the applicant involvements and accomplishments

See https://nationalaaaea.org/ website under "AWARDS" to apply for this award

Screen shot from the Website



Projects by NAAAEA

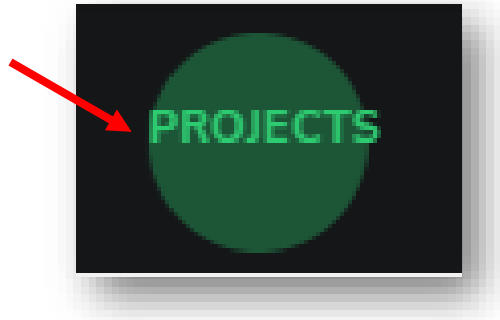
Projects by NAAAEA

The NAAAEA **Projects Program** is developed to provide technical assistance and initiate new projects in areas throughout the world, but especially in the Middle East. This program is modeled after the **Engineers Without Borders (EWB)** programs. However, the NAAAEA projects will be mainly in the Middle East, since EWB does not appear that they have projects in the Middle East.

WHAT IS NEEDED FROM ALL

1. AAAEA members (students or practicing engineers) are encouraged to show interest in this program. You can enter your information in the NAAAEA website (in the "PROJECTS" tab) and we will contact you once we have enough members that show interest in this program.
2. Company owners and other sponsors are encouraged to contribute funds and/or technical expertise.
3. You can contact agencies in the Middle East and encourage them to submit their project needs to NAAAEA. NAAAEA will investigate the feasibility of the project and implement, if found feasible.

Screen shot from the Website



TYPE OF POTENTIAL PROJECTS

1. Clean water infrastructure/treatment/purification
2. Water collection and distribution
3. Sustainable/renewable energy
4. Pedestrian bridges
5. Sustainable housing
6. Sustainable heating and cooking facilities utilizing efficient energy sources
7. Education and training
8. Sanitation infrastructure
9. Other projects, as suggested by NAAAEA community, or as requested by the needed area

See https://nationalaaaea.org/ website under "PROJECTS" to participate in this program

Disaster and Emergency Relief Technical Committee

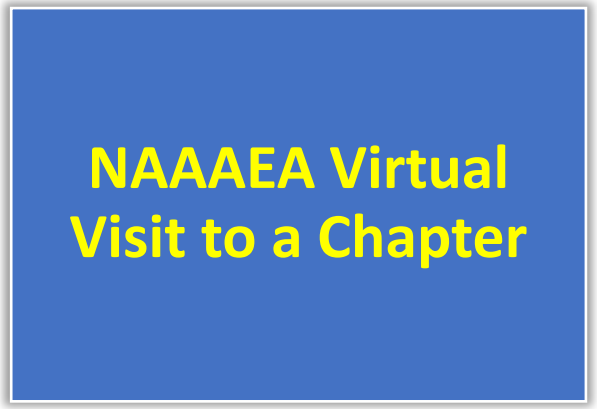
Disaster and Emergency Relief Technical Committee

Volunteer to be part of the **NAAAEA Disaster and Emergency Relief Technical Committee**

Simply send an email to info@nationalaaaea.org, or
via NAAAEA website https://nationalaaaea.org/contact-us/

This committee was established by NAAAEA in response to the Syria-Turkiye earthquake. However, the plan is to have the committee ready to address future similar events

NAAAEA Virtual Visit to a Chapter



The NAAAEA Board have been visiting the chapters virtually.

The purpose of these visits:

1. Brief the chapter leadership on the current NAAAEA programs
2. Solicit feedback on these NAAAEA programs
3. Answer questions about NAAAEA
3. Identify your Chapter's needs and how NAAAAA can help
4. Any other related topic your board want to discuss

The Chapter can either schedule a septate meeting for this visit or allocate 30 minutes for NAAAEA at your next monthly board meeting.

All Chapters are encouraged to contact NAAAEA to schedule a date and time for the virtual visit. NAAAEA will then arrange the meeting platform and send the Zoom invite.

Sign up to our Email List

Sign Up to Our Email List

Go to https://nationalaaaea.org

On the Home page, Click on **"Sign up to our Email List"**

Contact Us

Contact NAAAEA

Go to https://nationalaaaea.org

On the Home page, Click on **"Contact Us"**

NAAAEA E-Newsletter – May 2023

End