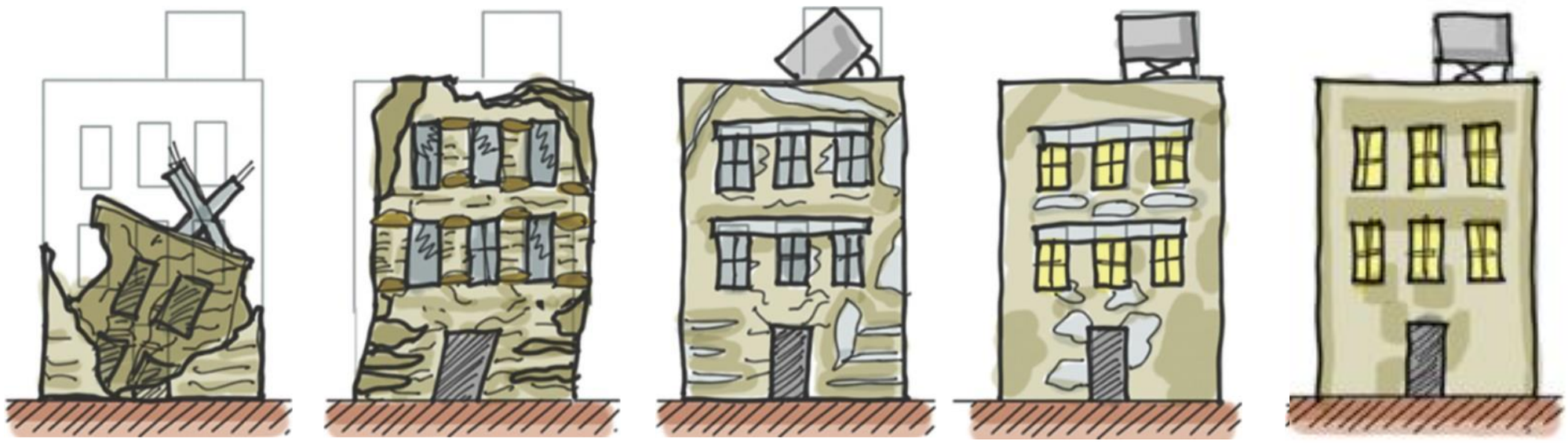
ငလျင်ဘေးအန္တရာယ် များမှရရှိသော စိန်ခေါ်မှုများနှင့် သင်ခန်းစာများ

(အများပြည်သူသို့ပညာမျှဝေခြင်း)

Challenges and Lessons acquired from 28th April 2025 7.7 magnitude Earthquake

(Knowledge Sharing for Non-technician)

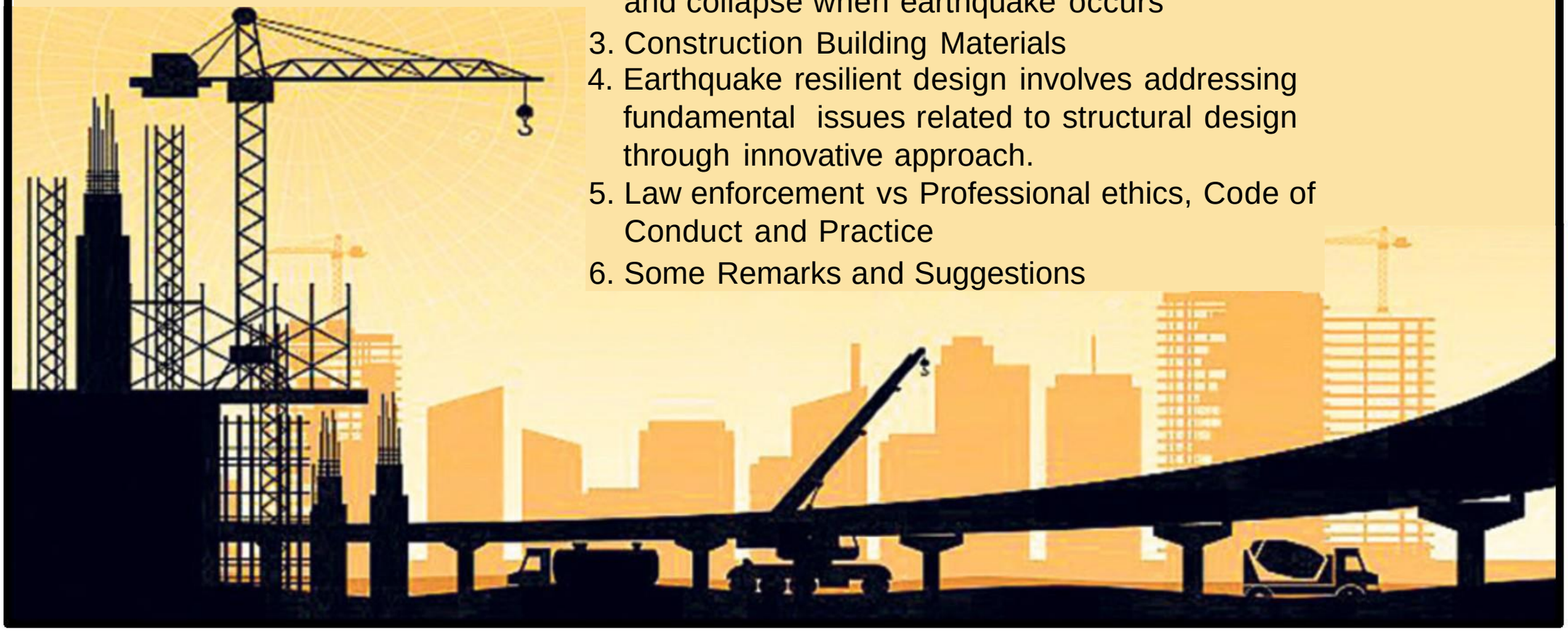
In all Architectural and Engineering Works, Human Safety is Paramount
That means nothing is more important than Human Safety



Collapse | Safety | Reoccupancy | Functional Recovery | Full Recovery

Contents

1. Introduction
2. What happens and why buildings sink, tilt, and collapse when earthquake occurs
3. Construction Building Materials
4. Earthquake resilient design involves addressing fundamental issues related to structural design through innovative approach.
5. Law enforcement vs Professional ethics, Code of Conduct and Practice
6. Some Remarks and Suggestions



1. Introduction

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ဆွေးနွေးပွဲ (Technical Forum)
ရည်ညွှန်းချက်။ Stakeholders များ ၂၀၂၅ (MNBC) ပါစုံနှုန်းများအား မဖြစ်မနေလိုက်နာဆောင်ရွက်စေရန်
အတွက် ပညာရပ်ဆိုင်ရာ သုံးသပ်ဆွေးနွေးခြင်း။

Vision, Mission, and Objectives of Collective works of Professionals
(Architects, Structural Design Engineers, Geologists, Geotechnica Engineers, Seismo ogist, and Urban Planners }

Purpose of Technical Forum : all stakeholders, all related Professionals need to understand collectively to have earthquake disasters resilience, sustainable and inclusive building design.

Our Goal: What we found from recent assessments on distractive buildings due to 7.7 magnitude earthquake on 28 May and how we can cope with the knowledge we acqUiired from the challenges and how we can improve the future environment to have balance between nature environment and man-made environment.

" To have technically sound, safe, and cost effective building design guidellines for All''

" To Live in Peace with Dignity, Happiness and Joy "

Our Mission: What shall we do for mitigation, prevention, and preparedness or savior earthquake.
" We all must work together to analyze systematically on the assessment results of the earthquake destructed buildings. Taking lessons and learn to understand from technical point of view and analyze carefully and seriously on the results of the finding of the causes of the effected buildings " and to have knowledge sharing Forums and Seminars between technicians and also with public.

Our Objectives:

1. To make sure that the building design serves its intended purpose effectively.
2. To provide all necessary information for design and construction of buildings.
   (Database based innovative design solutions that solves problems and meets the need.
3. Design should be sustainable and have a minimal environment. impact.
4. Design should be based on facts and data , not personal feelings or opinions.

Titles base on Challenges and lessons acquired from 28th. April 2025 Earthquake

Content

1. What we find from Earthquake disaster assessments.
2. Why it is important to clearly visualized what earthquake disaster leaves for us.
3. Why it is important earthquake disaster resilience sustainable and inclusive design development is essential.
4. Fundamental related issue involve in earthquake resilience design through innovative approach.
5. Law enforcement vs Professional Ethics, Code of Conduct and Practice.

Professionals involve in Earthquake Resilience Building Design

1. Architects
   - Integrating specialized features and techniques into the building's structure and overall design.
   - To help reduce damage caused by natural disasters and other factors.
   - To ensure a building's ability to prevent damage or recover when damage occurs.
   - Avoiding sites in (or) near a known flood zone on a protected slope or in a location with limited energy services or public transportation.

1. Structural Design Engineers
   - Ensuring structures can withstand various loads, environmental factors, and potential hazards, thus safeguarding lives.
   - Analyzing and assessing loads.
   - Select appropriate materials.
   - Designing for resilience.
   - Integrating with Architects and other disciplines.
   - Ongoing maintenance and adaptation.

3. Geologists:

Study age of pre-existing layers affected by ancient earthquakes as well as the new layers deposits after the earthquake.

4. Geotechnical Engineers

- Ensuring structural stability and safety
- Analyzing soil and rock properties to design foundation, slopes and earthworks.
- Minimizing risks from natural hazards like earthquakes and landslides.
- Optimizing construction processes for efficiency and cost effectiveness.

5. Seismologists

- Ensuing building can withstand earthquakes with minimal damage and loss with life.
- Understanding ground motion and its impact on structure, promoting ductility and energy dissipation in building materials, ensuring proper load path continuity and considering the efforts of soil structure intersection.

6. Urban Planners

- Take a crucial role in designing resilient cities from earthquakes by strategically managing land-use, infrastructure and building codes to minimize risks and enhance safety.

Suggestions:

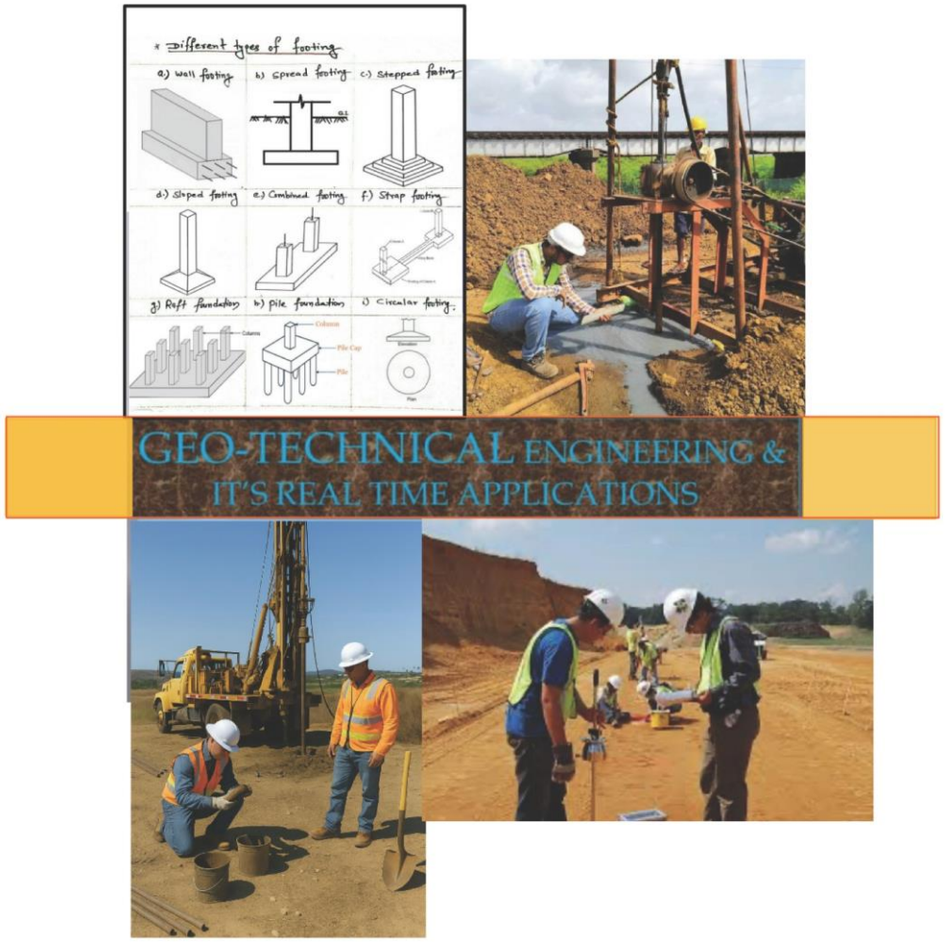
MEngC, MAC and other related Councils should make at least2 presentations, if possible 3 presentations.

Main theme of the presentation:

Challenges and lessons from 28th. April 2025 Earthquake.

1. Knowledge sharing for Non-technicians
2. Taking technical lessons from findings from destructive assessment
3. Why MNBC is important to have Earthquake resilience, sustainable and inclusive innovative building design

Why Soil Investigation is important for sustainable, resilience earthquake resistance Structure design



Gao-Mechanical Engineers,

play a crucial role in foundation design by bridging the gap between structural requirements and the intricacies of the ground beneath.

How they help in foundation design:

1. Site Investigations:
   To understand the subsurface conditions, including soil types, rock formations and groundwater levels.
2. Soil and Rock Mechanics:
   Assessing their strength, stiffness, and other properties.
3. Gtound water Assessment:
   Evaluating groundwater levels and flow, crucial for managing drainage and preventing water-related issues that could impact foundation stability.

Designing the Foundation:

1. Foundation System Selection:
   Based on the investigation and analysis, appropriate foundation type was decided.
2. Load bearing capacity.
3. Ground Improvement Recommendations.

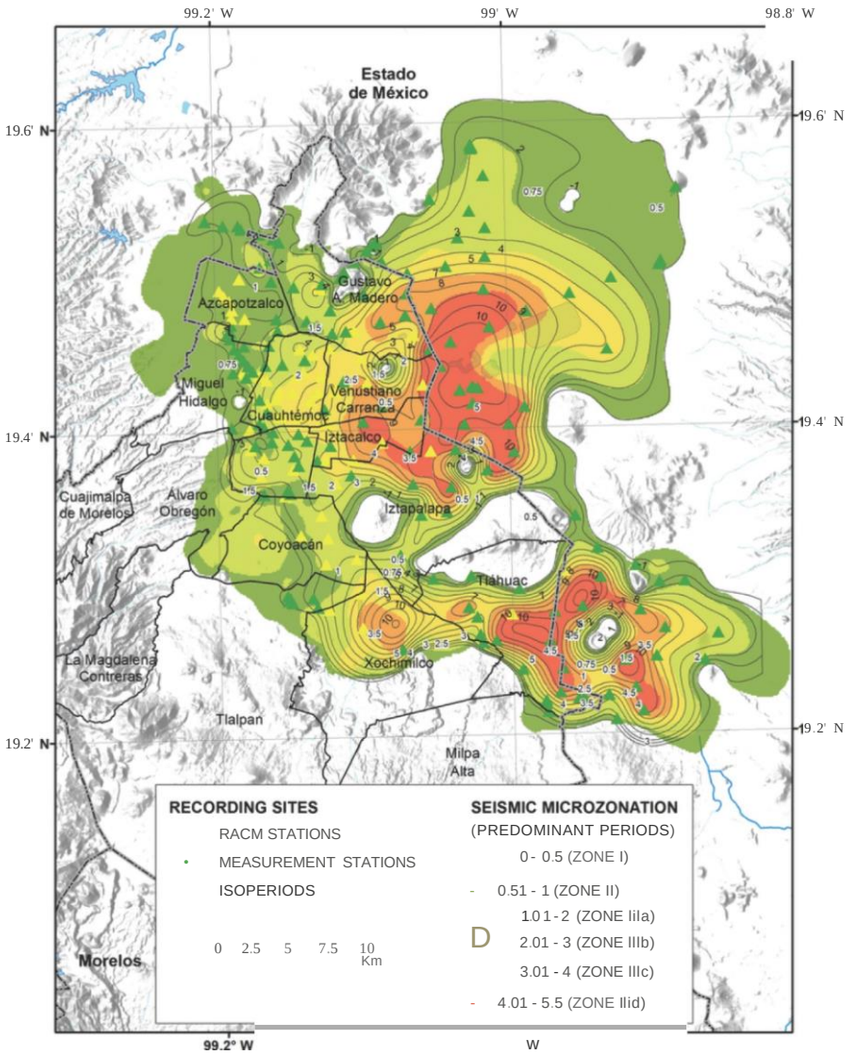
Ensuring Stability and Safety:

1. Slope Stability Analysis.
2. Seismic Conditions.
3. Risk management.

Optimizing the Design:

1. Cost-Effective Solutions.
2. Customized DEsign.

Why Seismology Data is important for Urban Planning and Site selection for Construction



Seismology data is crucial for Urban Planning and site selection because it helps identify seismic hazards, asses risks, and guide the development of resilient infrastructure. By understanding past earthquake activity and ground motion characteristics, Urban Planners can make informed decisions about where and how to build, minimizing potential damage and loss of life.

1. Seismic hazard maps, derived from seismological studies, show areas prone to ground shaking fault rupture, liquefaction, and landslides.
2. For assessing risk, Seismological data helps to know probability of earthquakes of inferential magnitudes occurring in specific locations, and provides information in calculating potential damage and loses, allowing for risk mitigation measures.
3. Seismological data guiding urban planner and selection for construction site and infrastructure development to avoid from high seismic risks.
4. Seismology data also helps for Emergency Planning and Response, for example, vulnerable areas and informing evacuation plans, including search and rescue operations and damage assessment.
5. For having sustainable Urban Development, promote sustainable development avoiding seismic hazards in land use planning, infrastructure development and building design that minimizes seismic risk and protect both people and property.

Urban Planning and Zoning regulations and other regulations to design and build resilient structure and building for safe and sound future development of urban communities.

Workmanship and supervision.

Why same building design does not suit well in different places?

Because of different type of soil and environment conditions.

Different construction materials and finishing materials have different effect from climate conditions and type of soils.

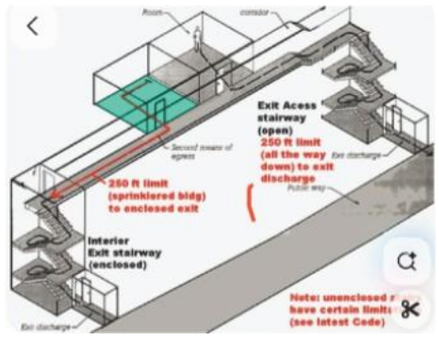
Brick structure, Concrete structure, steel structure and innovated type of structure, each has its own pros and cons.

Egress in Architecture

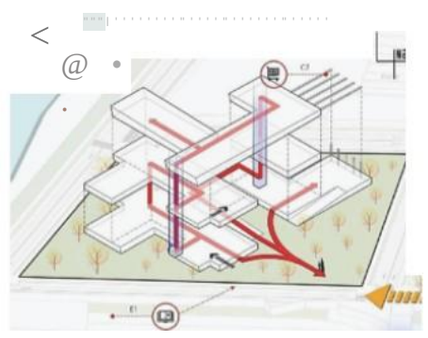
lead

A means of egress in Architecture is an unobstructed path to buildings, structures, and space.

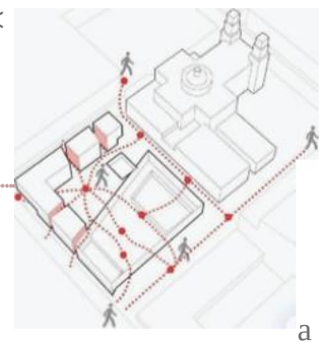
- As a continuous and unobstructed path out of a building to a public way.
- predefined paths that occupants use to exit a building during an emergency.



1. The exit acceu : path within the building that leads to an exit



2. The exit : doors to outside, enclosed exit stairways and horizontal exits



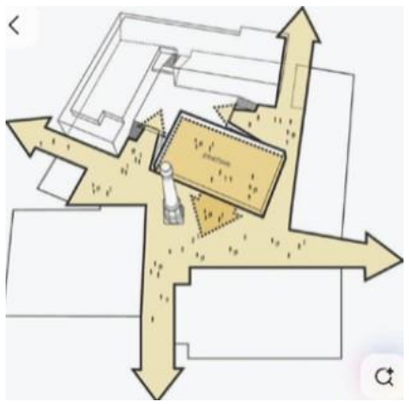
a

The required number of means of egress is determined by occupant load:

Occupant Load	Required Means of Egress
<500	2
500 999	3
>1,000	4

"Exception: BU1ld1ngs that have a low occupant load. such as mercant•le spaces, only requ re one ex•t.

v



S. The exit discharge : the rout from the exit to the public way

2. What happens and why buildings sink, tilt, and collapse when earthquake occurs

Earthquake-induced liquefaction, where saturated soil loses strength and behaves like a liquid, can cause significant environmental damage, including landscape changes, ecosystem disruption, and potential water quality issues.

Impact on infrastructure:

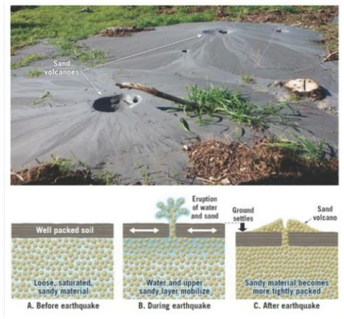
1. Damage to buildings and structure: liquefaction can cause buildings, roads, bridges, and other infrastructure to sink, tilt, or collapse.
2. Damage to utilities: Underground pipes and cables can be broken or displaced, disrupting, essential services.
3. Destabilization of foundations: Liquefaction can destabilize foundations, leading to structural damage and potential collapse.

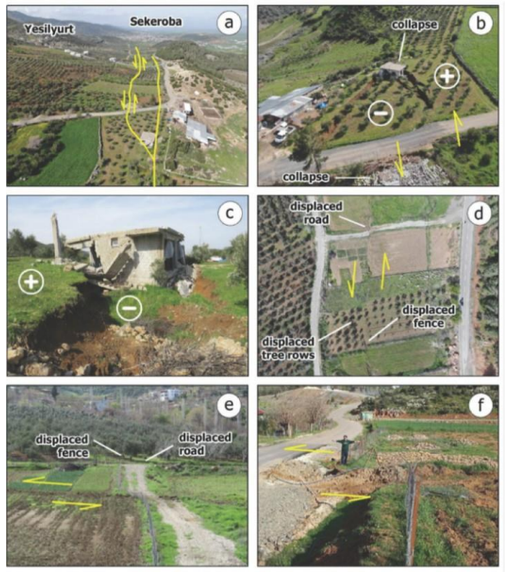
Ecosystem Disruption:

1. Habitat destruction: Liquefaction can destroy habitats and alter ecosystems, particularly in areas with wetlands or coastal regions.
2. Water quality issues: The movement of liquified soil and water can contaminate water source and disrupt water flow.
3. Landslides: Liquefaction can trigger landslides, further damaging ecosystems and infrastructure.

landscape changes:

1. Sand boil and fissures: liquided soil can force its way to the surface, creating sand boils (eruption of sand and water) and cracks in the ground.
2. Ground cracks and fissures: The ground can crack and deform as the soil liquifies and loses its structural integrity.
3. Erosion: liquefaction can lead to increased erosion, especially in areas where the ground is unstable.





a SCience Learn•ng Hub
Liquefact on - Science Learnin…

Britannica
What is liquefaction? | Britannica

"' SpringerUnk
Liquefact on Characteristics of 2…

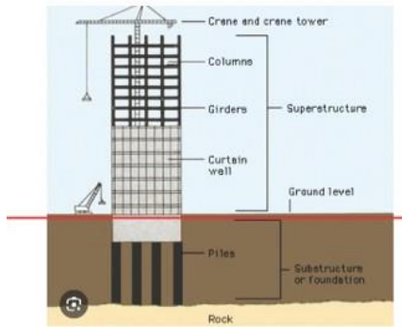
CJGeobear US
Soil Liquefaction Mitigation | Ge…

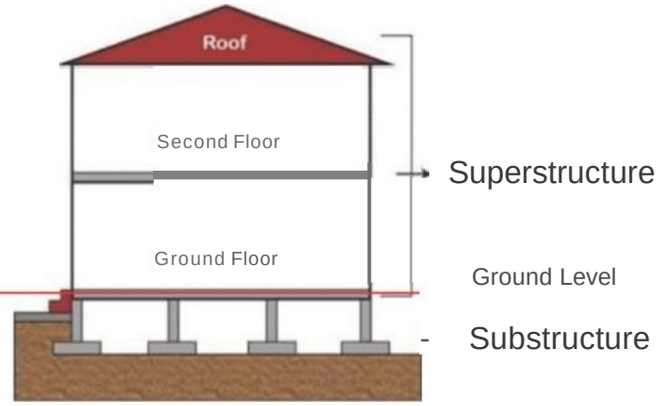
w Wik1ped•a
FileSink holes and liquefaction …

Full Circle - Arizona State University
Boosting seismic resilience

What is Substructure and Superstructure ?

Difference between
Substructure & Superstructure





Tilt sink

Substructure Failure

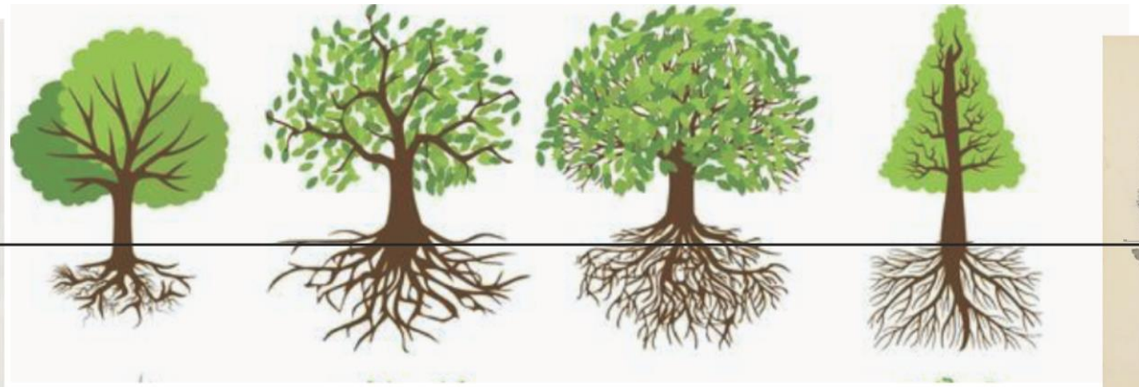
(Due to Soil condition, Structure Design or Poor construction , supervision, material specifation)

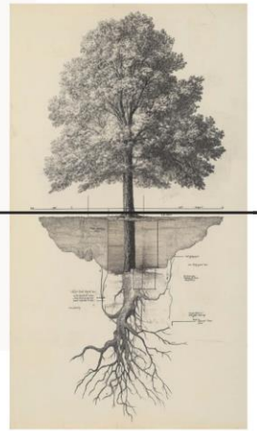
Superstructure Failure

(Structure Design or Poor construction , supervision, material specifation)

Collapse

Why trees fall due to Natural Disaster (Typhoon, Cyclone)

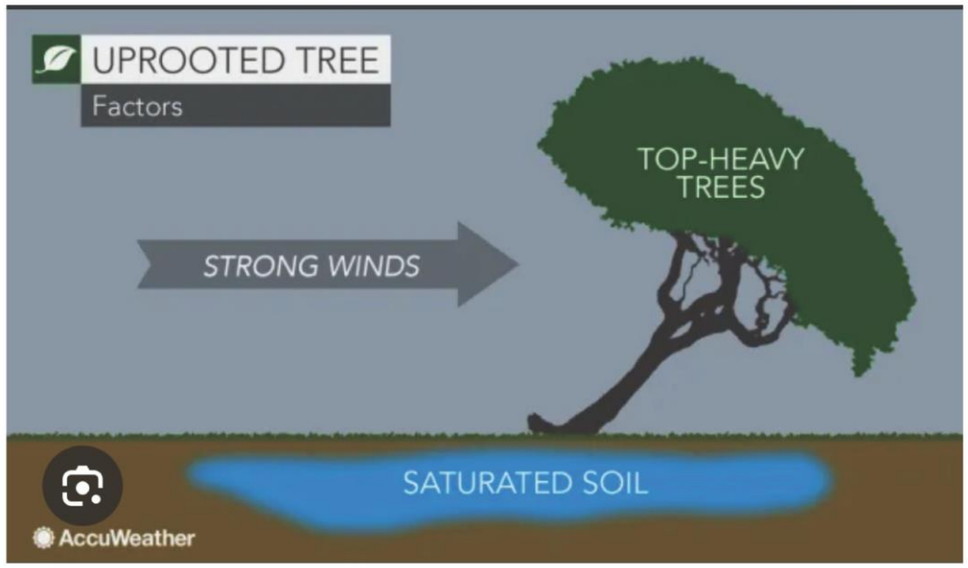




Superstructure

Dround Level

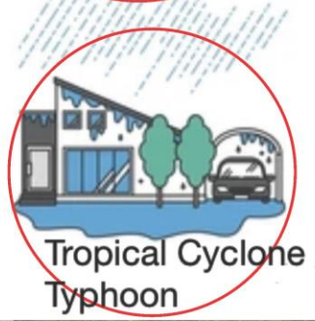
Substructure

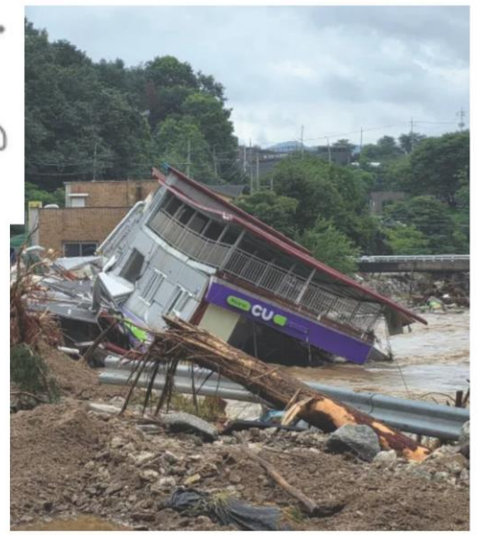


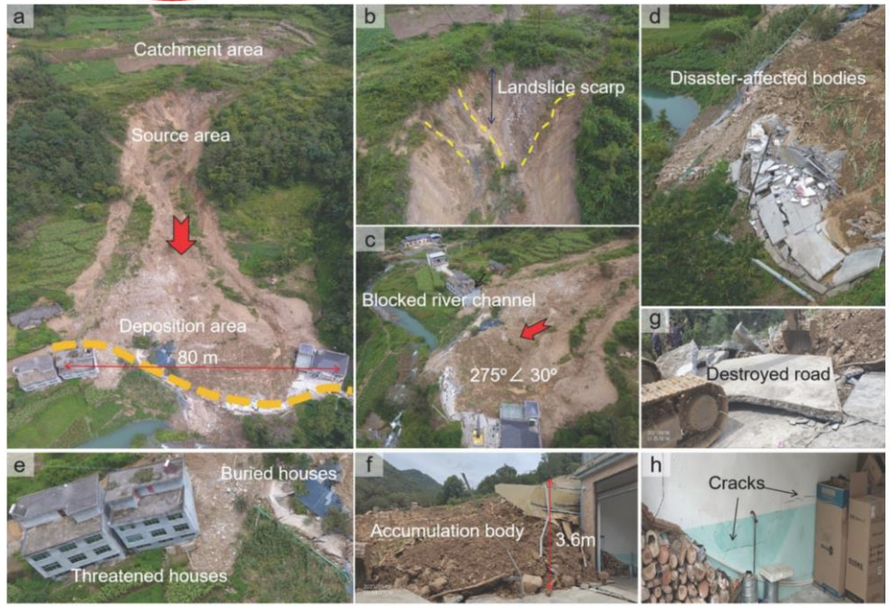
trees fall during typhoons primarily due to weakened root systems and saturated soil that can't anchor the tree against strong wind.
(Root damage, Heavy canopies, uncommon wind direction, Tree health, Poor Planting)

Natural Disasters which causes damages and claim many lives

Natural disaster causes the most damage: 1. Tropical Cyclone 2. Drougt/Wildfire 3. Flooding 4. Cold Witer Storms

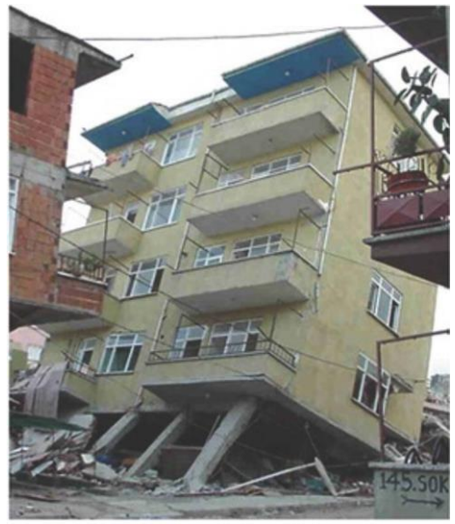






Structural Design Engineers & Seismologist

Right choice of building materials for safety and resilience to disasters risk.
Destruction effects because of using sub-standard materials, wrong choice of building materials, not using proper equipments and system, lack of proper design and supervision.

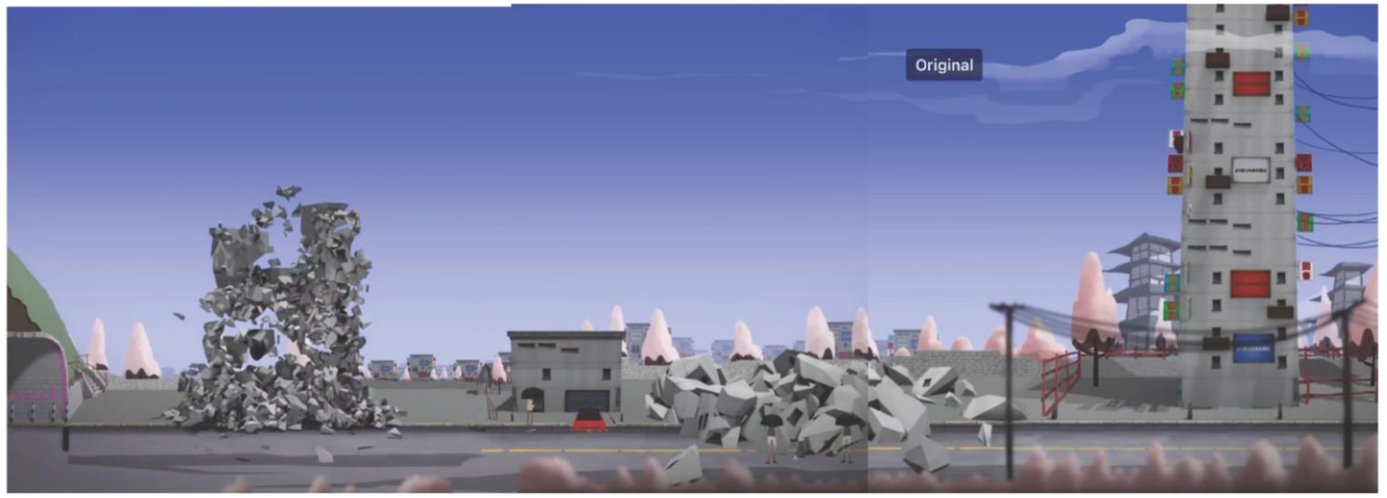


Soft story failure

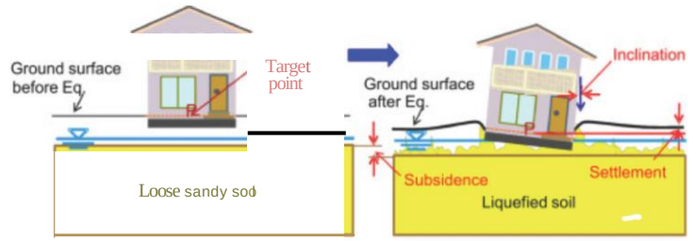
Short column failure [6]

Structural Design Engineers, Seismologist, and Geotechnical Engineers

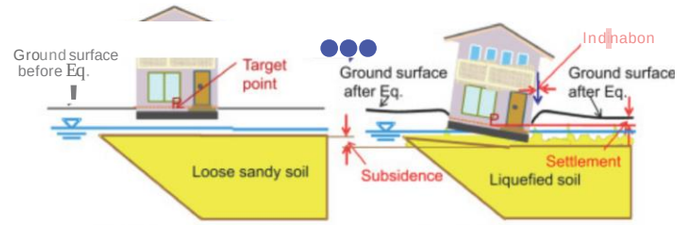
Why building collapse during earthquake? Building collapse during earthquakes primarily due to ground shaking generated by seismic wave. This shaking can cause structural weakness to fail, leading to collapse. Inadequate design, poor construction, and unsuitable materials are also significant factors. Additionally, soil conditions, like liquefaction, can undermine, and building's foundation can contribute to collapse.



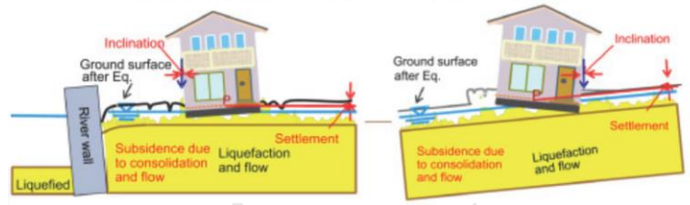
Resonance Frequency: a system naturally vibrates or oscillates with maximum amplitude when subjected to an External force or vibration. When a natural frequency of a building matches with the external vibration, it can experience resonance, leading to amplified vibrations and potential collapsed.



{I) Thickness of liquefied layer i - uniform in flatl and

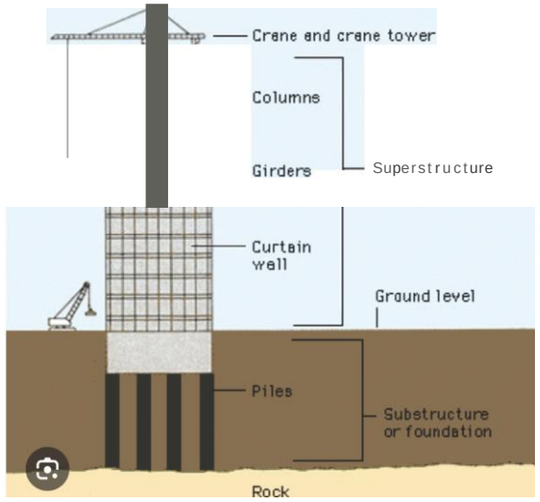


(2) Thickness of liquefied layer is non-uniform in flat land

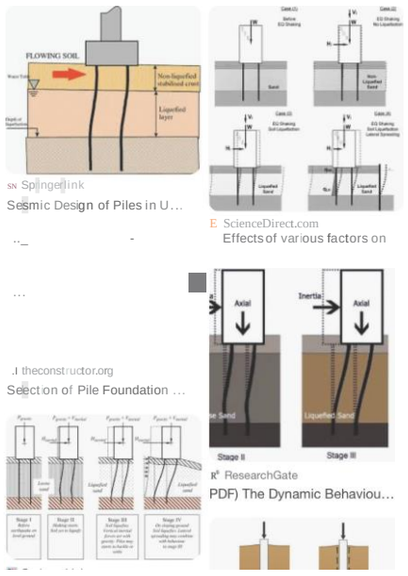


{3) Ground behind river wall {4) loping ground

Failure of building due to liquefaction



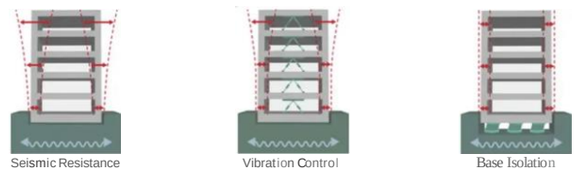
Why pile foundation was used for tall buildings Due to their ability to transfer heavy loads to deeper, and more stable soil layers.



Why tall building with pile foundation doesn't collapse

Earthquake Resistant Buildings

Engineering Resilience for Safety and Sustainability



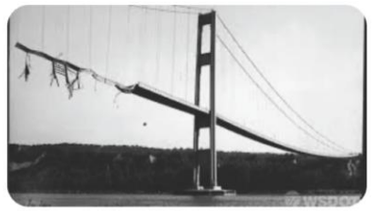
Structural Design Engineers & Seismologist

Oscillation frequency: (phenomenon called mechanical resonance) Refers to how often a repeating event, like a wave or vibration, occurs in a given amount of time. Oscillation describes the back-and-forth movement of an object or system around a central point or equilibrium.

Why bridge falls: the frequency at which the structure naturally tends to oscillate if it is displaced from its equilibrium position.

Why soldiers Don't March on Bridges? (Broughton Suspension Bridge)
Yes, a bridge can collapse due to soldiers marching in step. This phenomenon, known as resonance, occurs when the rhythmic steps of marching soldiers match the natural frequency of a bridge, causing it to vibrate with increasing amplitude until it potentially collapses.

Britannica
Tacoma Narrows Bridge | C…

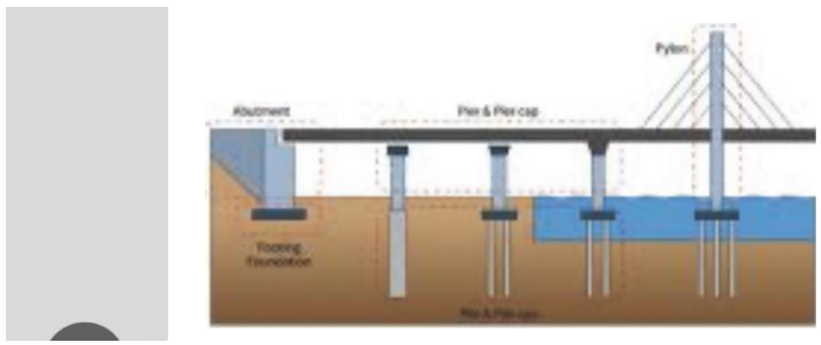


KATU
Galloping Gertie•: Looking b…

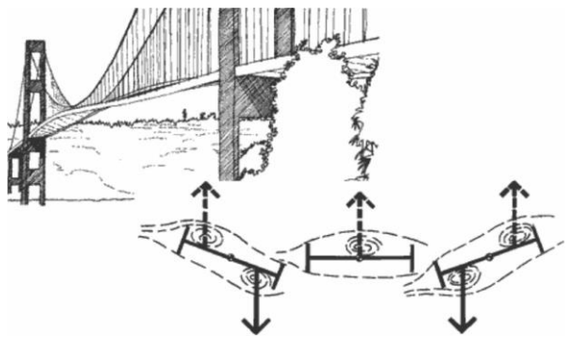
Math.Utah.Edu
Tacoma Narrows Bridge Pro…

KATU
Galloping Gertie•: Looking b…

Tacoma bridge fall due to strong winds caused the bridge to sway wildly from side to side.



Due to varying soil conditions, river characteristics, and the size/type of bridge itself. Factors like soil bearing capacity, depth of riverbed, and the load the bridge will carry influence the choice between shallow and deep foundations, and specific foundation types like spread footings, pile foundations or caissons.



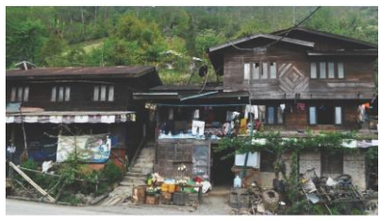
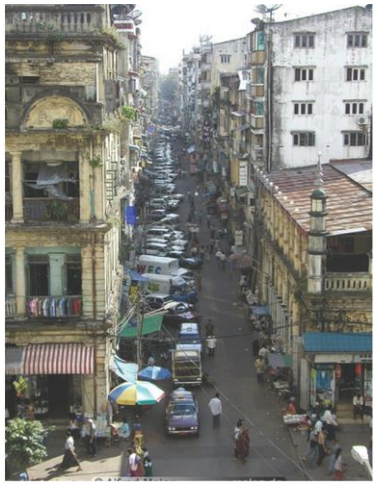
Tacoma Narrows Failure Mechanism- original sketch contributed by Allan Larsen

3. Construction Building Materials

Substandard materials which are available in the market has something to understand, why it was there? What are we going to do with those substandard Building materials especially reinforcing bar (local as well as foreign) for Reinforced Concrete. There are limitations in use of construction materials for different specifications for different types of building and design and constructions methods.

Two-story 4 bedroom house· ID 24411

Example of types of buildings with relation to their status depending on their locations means specifications of **building materials can be different from categories specified.**

Village	Town	Small city	Big city
			
			
			
			

4. Earthquake resilient design involves addressing fundamental issues related to structural design through innovative approach.

"Architecture begins, where Engineering ends"
" Scientists study the world as it is, Architects and Engineers create the world that never has been ".

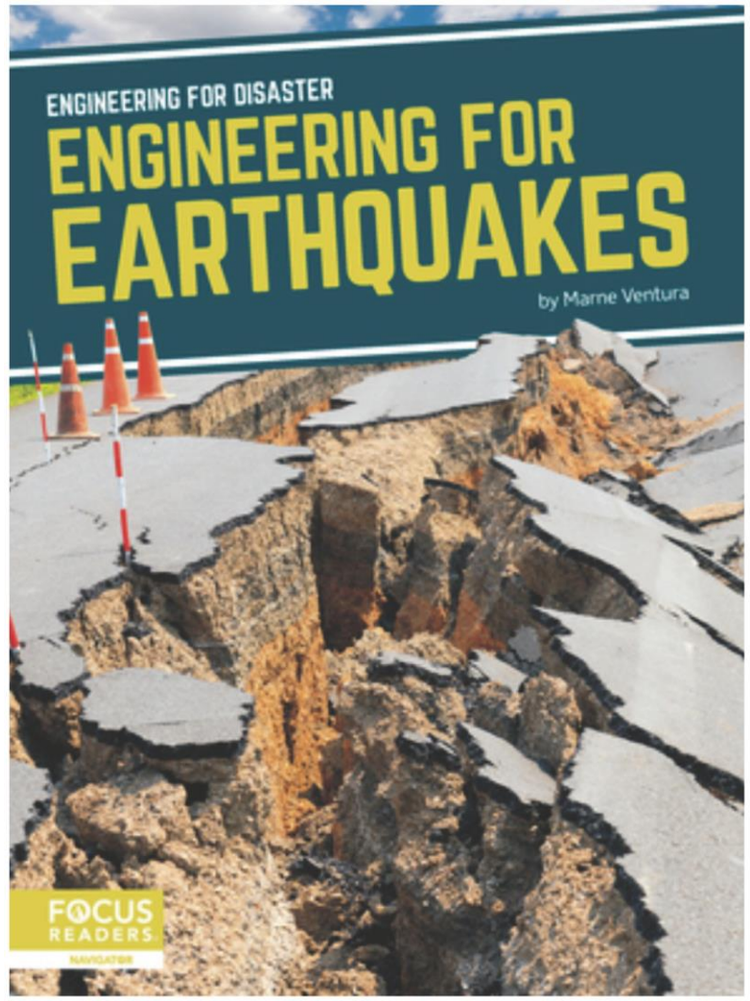
"Elbert Einstein"

Architectural Codes:

1. Architecture is not about form, but about the "Soul" of the Buildings, the "Spirit" of the people who live in "Them".
2. An Architect's Design must not only satisfy the requirements of it's occupants but also elevate their Spirits.

Structural Engineer's Codes:

1. Engineering problems are under-defined, there are many solutions, good, bad, and indifferent. The art is arrive at good solution. This is a creative activity, involving imagination, intuition and deliberate choice. (Ove Arup)
2. Failure is central to engineering. Learning from failures is crucial for engineers to improve designs and prevent future problems. Successful engineers are all about understanding how things break or fall.
3. You can't build great "Building on a weak "Foundation". You must have a "Solid Foundation" if you are going to have a strong "Superstructure". 070



Quotes for Construction Industry

1. Coming together is the "Beginning".
   Keeping together is "Progress".
   Working together is a "Success".
2. Construction is a matter of "Optimism". It's a matter of facing the future with confidence.

The fundamental principles of structural design:

1. Functionality:

   The building must serve its intended purpose effectively. This includes considerations for circulation, accessibility, and efficient use of space.

2. Aesthetics:

   The building's appreance should be pleasing and contribute to the overall environment. This involves considerations for style, materials, and visual appeal.

3. Sustainability:

   Modern building design prioritizes environmental responsibility. This includes using energy efficient systems, sustainable material, and designs that minimized environmental impact.

4. Context:

   The building should be designed in harmony with its surroundings, taking into account the local climate, culture, and surrounding landscape.

5. Hierarchy:

   Determining the order of importance of elements within the building. .

6. Economy:

   Structural design must be cost-effective, considering material costs, construction methods, and labor expenses.

7. Equilibrium:

   A fundamental principles is that a structure must be in a state of equilibrium, meaning the sum of all forces acting on it must be zero, ensuring it remains stationary.

8. Load transfer:

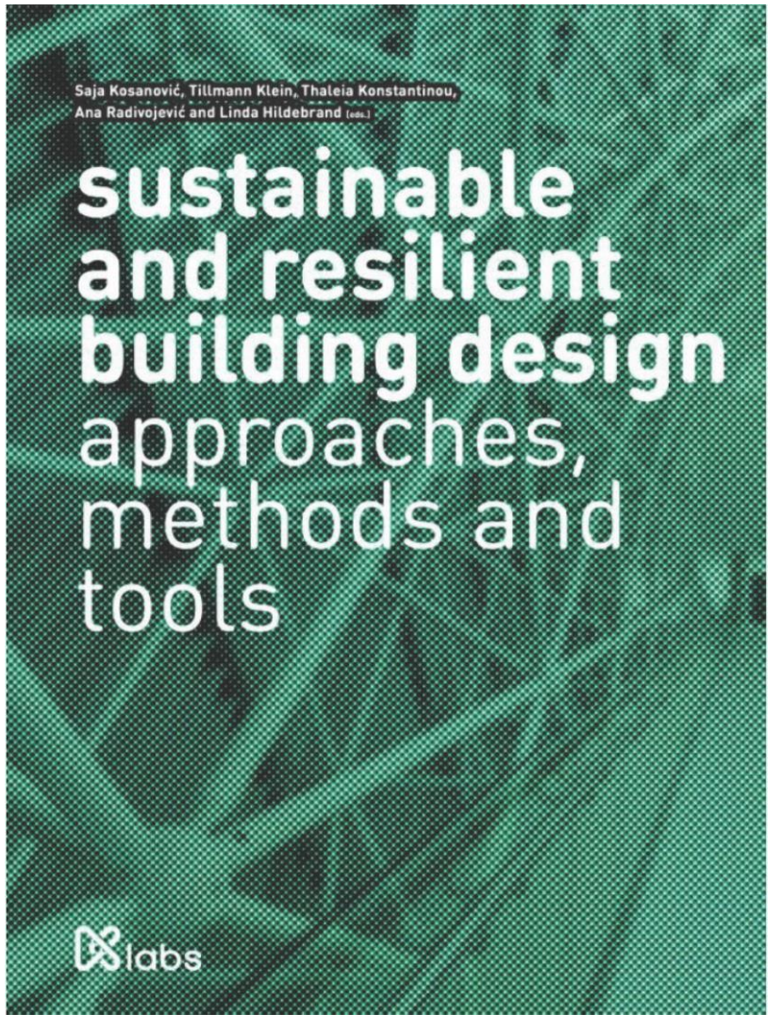
   Structures are designed to have efficient transfer loads from where they are applied to the foundations and ultimately to the ground.

9. Material Selection:

   Choosing appropriate materials is crucial for strength, durability, and cost-effectiveness.

10. Compliance with Codes and Standards:

    Structural e-sign must adhere to relevant building codes and standards to ensure safety and reliability.



5. Law enforcement vs Professional ethics, Code of Conduct and Practice

Each and everyone at all levels should have to follow personal ethics, professional ethics, organization rules, regulations, policies and procedures. We have it, only thing is to abide with the law and regulations. However we still need to have proper and recognized laws and regulations for one story to seven stories building. Whereas clear understanding between MAC, MEngC, YCDC need to sort out to have the most appropriate rules and regulations to have effective and efficient work process and acceptable system in design, permit application, construction and supervision working plan, for Development Committee's to have a smooth service for issuing Building Construction Permit and Building Completing Certificate (BCC).

YCPCc MACe MEngC. Fed. ME t HP8C working as a team.

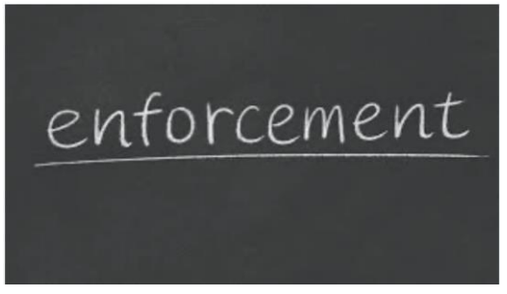
We all need to know how it works as a " Team ". Each of the above mentioned organizations has their own Vision,Mission, and Objectives. They are all working together for High-rise Public Building assessment. HPBC group was formed by representatives from MAC,MEngC,Fed. MES, Experts from related subject in construction industry.

Vision of HPBC. To safeguard the lives and properties of the people and public infrastructures in Myanmar.

Mission of HPBC: > To specify guidelines for quality control of high-rise and public building projects that are bound to be observed by Architects, Structural, Geotechnicai,Mechanical and Electrical Appliances, Water Supply and Sanitation Works etc., of the proposed projects ensuring that these calculations strict;y follow the guidelines and code of practices of HPBC.

> To cooperate with all other relevant departments and organizations to achieve high ranking Construction Industry Development in Myanmar.

> To pay visit to the construction sites and check whether they are implemented in accordance with design specifications and standards, HPBC guidelines or not give necessary advices on quality control and safety.



Consistency Consistency is important, because it builds trust, creates reliability, and allows for predictable outcomes, making more dependable in personal and professional relationships. It also helps establish strong habits, fosters momentum, and enables individuals to achieve long-term goals by consistently taking action towards them, ultimately leading to improved results and a Better stronger reputation.

Professional practice specially refers to the actions and behaviors of individuals within their context, often referred to as "Standard of Practice".It extends beyond mere technical skills and includes ethical conduct, decision-making, and interactions with others.

Each and everyone at all levels should have to follow personal ethics, professional ethics, organization rules, regulations, policies and practice

Not only knowing but also to follow and practice

THE ENGINE'!R$ MANUAL

PROf'E&SIONAL PRU'TICE G DnJN£1

1. Although we all know that when we want to build in earthquake zone we must consider earthquake factor to include in designing structure design, some never follow.
2. Building construction contractors must always follow construction rules, regulations, process and procedure, doesn't matter whether it is small medium or large.
3. To have knowledge and awareness, mapping of earthquake affective areas, showing their intensity, degree of effects on buildings and natural environment. (For example buildings, percentage of totally destructed, partial destruction means can renovated, free from destruction.
4. Concern authorities have issued required zoning guidelines, population density, environmental impact assessment regulations. These regulations, guidelines, policies and procedures are most related to disasters mitigation program.
5. All professionals, investors, developers, and owners are responsible to understand well and important to abide with it in our professional practice.

Architect's Professional Practice Manual

Dos and Don'ts for Owners, Designers and Contractors during construction

Dos

1. Clearly defined the project scope and requirements
2. Appoint competent professionals
3. Ensure adequate resources and time
4. Maintain open communication
5. Make timely decisions
6. Monitor progress and provide feedback
7. Ensure site safety
8. Respect the contractor's expertise
9. Review and approve changes promptly
10 Seattle payments according to the contract
11 Address safety concerns.

Don'ts

1. Micromanage the construction
   Avoid constantly interfering with the contractor's method's and daily operation.
2. Make late changes to he design or scope
   Avoid making significant changes after the project is underway. This can lead to delays and increased costs.
3. Fail to communicate effectively
4. Disregard safety regulations
5. Interfere with the contractor's schedule
6. Questioning the contractor's professional judgment
7. Withhold payment without reason
8. Bring unauthorized personnel onto the site

The Public needs awareness about the importance of safety and well-being in design and construction for all stakeholders

Specific areas of awareness for the Public

1. Site Safety
2. Personal Protection Equipment (PPE)
3. Building Codes and Regulation
4. Importance of Consultation and Communication
   (Design, Consultancy, and Supervision)
5. Long-term impact of design concept and construction material choices
6. Accessibility and Inclusivity
   (Being aware of the importance of designing spaces that are accessible and usable by people of all abilities)
7. Ergonomics
   (The study of people in their working environment. The goal is to eliminate discomfort and risk of injury due to work)
8. Sustainable Design

How to achieve Public awareness

1.Community Engagement
   (Holding public forums, workshop, and presentations to educate the public about design and construction practice)
2. Educational Materials
   (Developing brochures, websites and social media content that explain key concepts in an accessible way)
3. Construction Site safety management
4.Partnership with local Organizations
5 Media Campaigns

6. Some Remarks and Suggestions

Some suggestions on meaning of mitigation, preparedness, and recovery in building industry regarding to earthquake resilience building design

Introducing for why building collapse due to earthquakes.
How can we prepare to withstand earthquakes if the earthquake hits us without warning.

Mitigation in Building Design, Construction (Building Industry) to refer to the process of reducing and minimizing potential risks, hazards, or negative impacts associated with a project.
In the other hand for community's resilience by identifying risks and vulnerabilities while developing strategies to reduce these threats.

1. This earthquake strikes us in a very different way.
Earthquake waves formed by earth movement due to the displacement of plates.
After Primary (P) wave strike with (7.7) the Secondary (S) wave strike with (6.7) hits us in a very short time. The resonance exceeds our structure's natural resonance. This the main cause.
Resonance is the occurrence of a vibrating object causing another object to vibrate a higher amplitude.

Example:
Pushing a person in a swing is a common
example of resonance. The person will fall if he/she cannot hold the push which makes him shake. If he can stand the challenge he will not fall. However when the second push applies to him he will fall because he cannot stand any more. The main cause is he not in control stage.
If he is prepared to be able to stand he will not fall due to that pushes. Even then, if the push exceeds his ability to withstand he will fall. Anyway if he does have some form of offensive ability, say he knows how to handle the offense to his prepared defensive position to handle it in his defensive ability, he will be able to handle it not hurting seriously. Means he can save himself from being hurt severely and get back to his best form after the injury being treated.

Mitigation, Preparedness, Recovery
1. Meaning in Disaster Management
Prevention, Mitigation, Preparedness, Response and Recovery are 5 steps of Emergency Management.
Mitigation:
is the effort to reduce loss of life and property by lessening the impact disasters and emergencies. Also mitigation is an on going process that is focused on long-term solutions.
Recovery:
The goal of the recovery phase is to bring the affected area back to some degree of normalcy.
Preparedness:
seeks to rectify the short-term effects of hazards.
Prevention:
Focus on disasters and emergencies that can be prevented by changing or regulating human behavior.

2. Meaning in Building Management for Resilience and Sustainability Construction management
Mitigation and Preparedness:
A strategic risk response wherein a project team takes active steps to reduce the probability or impact of a negative risk to a project.
To make less severe or serious. It also involves preparing of well designed plans to structure the entire post-disaster response, familiarizing the stakeholders, particularly the communities through training and simulation exercises.
Mitigation in design:
Architectural and Civil Engineering Designs and Plans should take into consideration how to reduce environmental effects. Good Construction environmental management planning will reduce the likelihood and severity of environmental risks and accidents.
(identify potential risks and taking proactive steps to reduce or eliminate them.

Performance Based Structural Design

What we found from recent assessments on distractive buildings due to 7.7 magnitude earthquake on 28 May and how we can cope with the knowledge we acquired from the challenges and how we can improve the future environment to have balance between nature environment and man-made environment.

Building Performance Levels during Earthquakes can be categorized by the extent of damage and functionally after the event

Client to choose the Building Performance level

1. Operational Level (OL)
   The building remains fully operational after an earthquake, with minimal damage.
2. Immediate Occupancy (IO)
   The building has minor damage but remain safe for occupancy.
3. Life Safety (LS)
   The building has moderate damage, but life safety is ensured.
4. Collapse Prevention (CP)
   The building has significant damage and is near collapse

Color for Building catagories after shock

Blue color	(weak=Minor Repair}
Orange color	(strong= Major Repair and Retrofit)
Red color	(violent=Collape prevention or demolish)

Color for Earthquake depth

Blue or Green	(Deep earthquake)
Orange or Yellow	(Intermediate depth)
Red color	(Shallow earthquake)

LINDA K.
BURTON