# An under construction building collapse: Myanmar Earthquake: Lessons to learn

**1. Introduction**

A powerful earthquake with a magnitude of 7.7 struck the region, causing widespread destruction across Myanmar, Thailand, and neighbouring countries on 28th March, 2025. It is reported to be one of the severest earthquakes in the last 200 years.


*Source: The Nation*

April 2025

**2. The Incident**

A 30-storey building under construction in Bangkok, near Chatuchak Market, collapsed following the earthquake. At the time of the incident, approximately 400 workers were present on site. Initial estimates suggest nearly 100 workers were in or around the building at the moment of collapse.

A survivor shared, "It took one minute for it to collapse," emphasizing the catastrophic nature of the event.

**3. Visual Evidence and Structural Details**

A dramatic video captured the collapse, with a crane visible atop the structure and a large dust cloud rising afterward. The building belonged to the National Audit Office and had been under construction for three years at a cost of over two billion Thai Baht ($59 million USD).

From visual inspection, the structure appears to be a reinforced concrete frame. The project, managed by ITD-CREC (a joint venture between Italian, Thai, and Chinese firms), had reached its full height and was about 30% complete at the time of the collapse.

Source: The Nation

**4. Preliminary Analysis of the Collapse**

While technical investigations are still underway, the Bangkok Fire and Rescue Department attributes the collapse to an unstable structure.

Professional Engineer Mr. Casey Jones conducted a visual analysis and suggested that the failure originated in the upper floors, likely due to:

- Incomplete structural connections
- Insufficient concrete strength, especially in the upper floors
- Inadequate formwork and temporary supports
- Poor or incomplete execution of ductile detailing of reinforcement bars

**5. Seismic Code and Building Safety in Thailand**

Thailand revised its earthquake code from B.E. 2550 to B.E. 2564. Under the updated code:

- Bangkok falls into Seismic Zone 2, classified as a "moderate seismic zone."
- The code divides regions into three seismic zones (Zones 1, 2, and 3), each with varying levels of expected seismic activity.

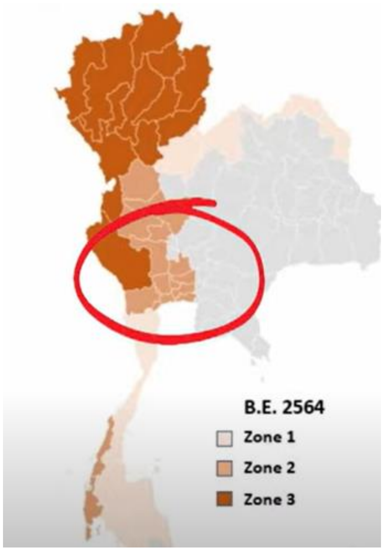



***Fig:*** *Bangkok highlighted in the new seismic map*

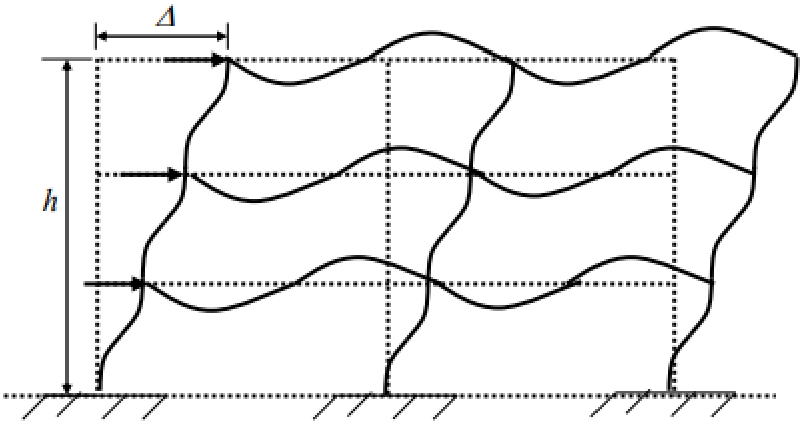
Seismic Zones

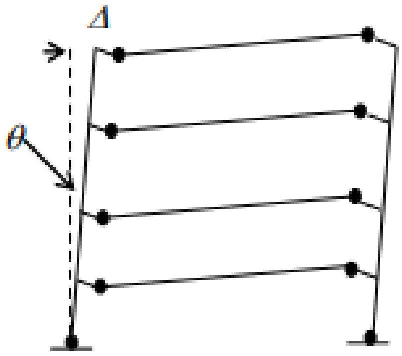
Similar to the old regulation, there are still three seismic hazard zones in the B.E. 2564 regulation, but they are re-named as follows:

Zone 1 (formerly "Observation zone") represents a low seismic zone.
Zone 2 (formerly "Zone 1") represents a moderate seismic zone.
Zone 3 (formerly "Zone 2") represents a high seismic zone.

## 6. Deformation pattern under seismic forces on multi storeyed buildings

The seismic load acts as an axial horizontal load. The general deformation pattern for multi-storeyed buildings can be visualised as follows.




*(Source: INSDAG TRM)*

## 7. Lessons for India: How to Improve Building Safety

This tragic incident highlights the urgent need for robust building practices, particularly in seismic zones. In India, we can take the following measures:

- Always involve a qualified structural engineer in building design
- Adhere to national / regional seismic building codes
- Temporary structures should be properly placed while in the construction stage
- Practice and implement seismic design and detailing of structures specially in high-risk areas
- Connections should also be designed in adherence to seismic guidelines

- Concentric bracing may be designed to resist the horizontal seismic load

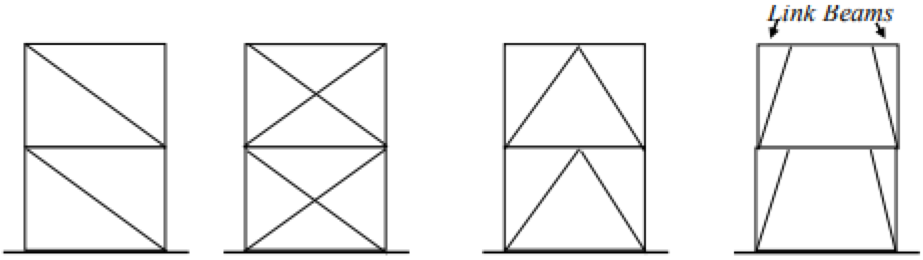



*Fig: Bracing systems in steel frames* *(Source: INSDAG TRM)*

- Enforce stringent structural audits
- Ensure proper formwork design and re-propping on lower floors during construction
- Adopt steel intensive structures wherever possible to have more ductility in the structures.

**8. Advantage of Steel Intensive Structures**

**Reasons for Higher Ductility in Steel-Intensive Structures**

1. **Inherent Material Properties**
   - Steel exhibits **high yield strength and significant strain-hardening**, allowing it to undergo large deformations before failure.
   - Unlike brittle materials (e.g., concrete), steel can sustain **plastic deformations**, making the buildings more ductile.
2. **Energy Absorption & Seismic Resistance**
   - The ability to form plastic hinges without sudden failure improves overall **structural resilience**.
3. **Redundancy & Redistribution of Forces**
   - In **well-designed steel frames**, loads can be re-distributed even if local yielding occurs, preventing catastrophic collapse.
4. **Welded & Bolted Connections**
   - Steel structures often use **welded and bolted joints**, which offer controlled deformation mechanisms.
5. **Experimental & Research Evidence**
   - **Studies on moment-resisting steel frames** show structure's ability to withstand large inelastic deformations.
   - Research on **composite steel-concrete systems** indicates enhanced performance under seismic loads.

## 9. INSDAG's Role in Promoting Earthquake-Resistant Design Structures

INSDAG continues to disseminate knowledge through various efforts under various target segments:

- **Workshops and Training:** Regular workshops focus on seismic-efficient design and compliance with relevant codes
- **Mason Training Programs:** Modules on seismic detailing with reinforcement bars, including live demonstrations of ductile detailing techniques, are conducted for masons / bar benders
- **Technical Resources:** The updated Technical Resource Materials (TRM) includes a dedicated chapter on "Earthquake Resistant Design of Steel Structures"
- **Expert Lectures:** A recent Foundation Day lecture titled "**A Journey from Ductile Steel to Ductile Steel Buildings**" was delivered by Prof. C.V.R. Murty, P.S. Rao Institute Chair Professor at IIT Madras. The recorded version of the lecture is available in **INSDAG's YouTube** channel for public access.

### References:


- The Nation
- BBC
- FE
- Blog of Casey Jones – Professional Engineer
- FEMA 356 (Prestandard and Commentary for the Seismic Rehabilitation of Buildings) –
- Eurocode 3 (EN 1993-1-1)
- AISC Seismic Design Manual
- INSDAG Teaching Resource Material for structural design