SOME OBSERVATIONS FROM THE M7.7 MYANMAR EARTHQUAKE ON MARCH 28, 2025

Chatpan Chintanapakdee[1,*]
[1] *Chulalongkorn University, Bangkok, Thailand*

*Corresponding author: Chatpan.c@chula.ac.th

1. INTRODUCTION

The M7.7 Myanmar earthquake on March 28, 2025 was the first earthquake that caused structural damage to tall buildings in Bangkok. Due to the long period nature of very long-distance ground motions at more than 600 km away from the fault rupture zone, most of damage found in Bangkok occurred in tall buildings. A 30-story building under construction totally collapsed within a few minutes after strong shaking arrived. Many tall buildings shook violently and at least suffered some damage to non-structural components like falling of gypsum ceiling and wall tiles, cracks in masonry walls. Some tall buildings suffered further damage in main structural components like concrete crushing at reinforced concrete (RC) walls and diagonal shear crack at an RC column. This event has totally changed the belief of many people that Bangkok would not be strongly affected by earthquakes. This paper presents some observations that were made from photographs and vdo clips posted on social media and from some damage found during buildings surveys after the earthquake.

2. STRUCTURAL DAMAGE

Many tall buildings had compression failure of RC walls visible from outside of the buildings. Concrete crushing was obvious and some rebar buckling occurred in many cases. Such damage could be due to high stress concentrations at some locations in the buildings, mostly around mid-height and some near the ground floor, or could be due to construction defects, i.e., poor concrete strength because of poor handling or lack of curing. A 25-story building had its 300-mm thick RC wall crushed so severe that there are some big holes through the wall. Fortunately, the remaining part of the wall can still carry the high vertical load in such a tall building. Such distress in main structural components means that the gravity load must have been carried by the nearby members where stress would be higher than usual and the safety margin against future earthquakes would be significantly compromised.

Some buildings suffered loss of load carrying capacity such that the floor elevation became lower than before the earthquake hit and this spoiled building normal operations and occupancy. Typically, the elevators of tall buildings are very sensitive to the alignment of RC core walls. Many elevators must be shut down and are still awaiting corrective actions before they can return to normal operation. Some tall buildings have lost more than half of number of elevators, so the vertical movement in the building becomes problematic and ensues very long wait time.

Figure 1. Concrete Crushing in RC Wall of a 25-Story Building in Bangkok

An 8-story building in Chiangmai, which is considered a high seismic zone, suffered column buckling at many locations. It is noticeable that the tops of these columns are not properly braced by beams as the beams were not aligned along the gridlines of columns. This echoes the importance of having beams bracing all column heads to control the rotation and sway of the columns. Such inappropriate locations of the beams cause the lack of moment-resisting frame action so there is inadequate lateral force resisting system in this building. This type of design should be prohibited in seismic prone areas.

Figure 2. Column Buckling in an 8-Story Building in Chiangmai

3. NON-STRUCTURAL DAMAGE

Besides the structural damage mentioned above, construction equipment like tower cranes had toppled down in many locations. Such failure inevitably caused life of the operator right away. The free-standing unbraced height may be too high, or the tower structural member and connections were not adequate to resist the lateral load. Such incidents called for improving standard of practice of this equipment.

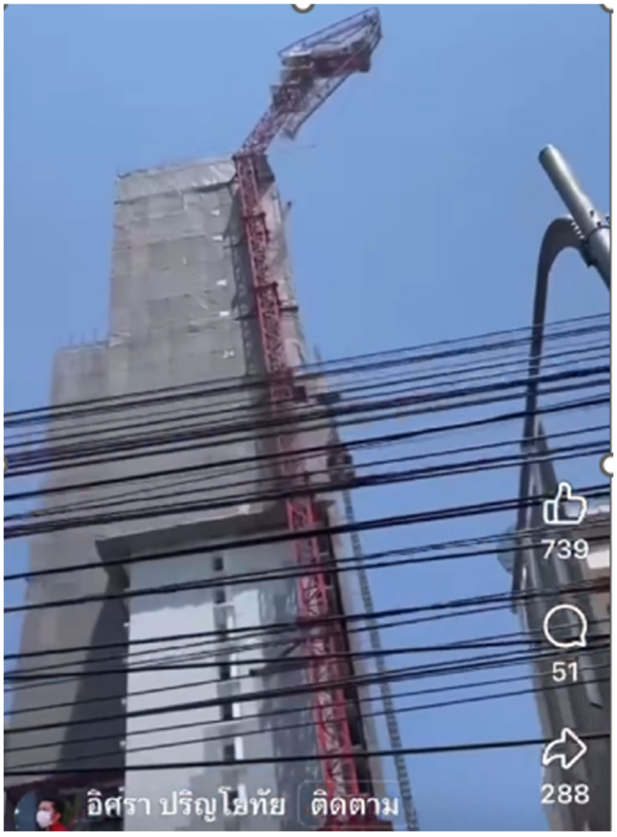

Figure 3. A Construction Tower Crane Toppling in Bangkok

Majority of tall buildings in Bangkok experienced at least some damage in non-structural components. Several cracks in masonry walls occurred in many tall and midrise buildings in Bangkok. Wall tiles fall are also commonly found. In addition, gypsum ceiling was often found to be damaged and fell in many tall buildings. This could obstruct evacuation in case of emergency. By looking closely at the remaining ceiling frame, the fall was due to buckling of the ceiling frame causing screws to be pulled out of the gypsum board. In the future, a better connection type is warranted to ensure that occupants can evacuate safely.

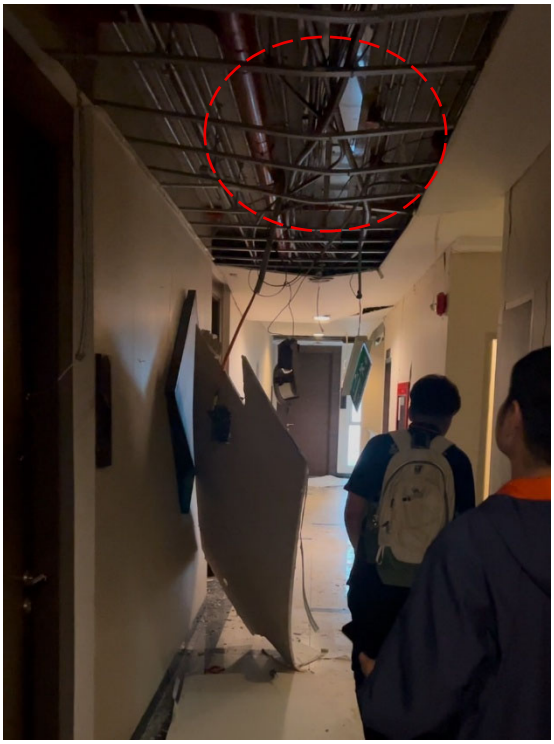

Figure 4. Ceiling Falls in Many Buildings in Bangkok

4. CONCLUSIONS

This event totally changed the belief of many people about the extent of damage that earthquake can affect Bangkok. Buildings and many activities in Bangkok must take earthquakes into consideration as a plausible major disaster. The observations and lessons learned from this event provide new findings that should be used in making plans and recommendations for better preparedness in the future.