

RESPONSE OF MID-RISE REINFORCED CONCRETE FRAME BUILDING TO THE 2017 PUEBLA EARTHQUAKE

PEER – CEER Post-Earthquake Field Investigation Program

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1. The Mw 7.1 Puebla Earthquake

On September 19, 2017 a moment magnitude Mw 7.1 earthquake struck the central region of Mexico at approximately 1:14 p.m. local time. The epicenter was located at approximately 120 km from Mexico City. The epicentral coordinates reported by the United States Geological Survey (USGS) are 18.550° N, 98.489° W with a depth of approximately 50 km (USGS, 2017).

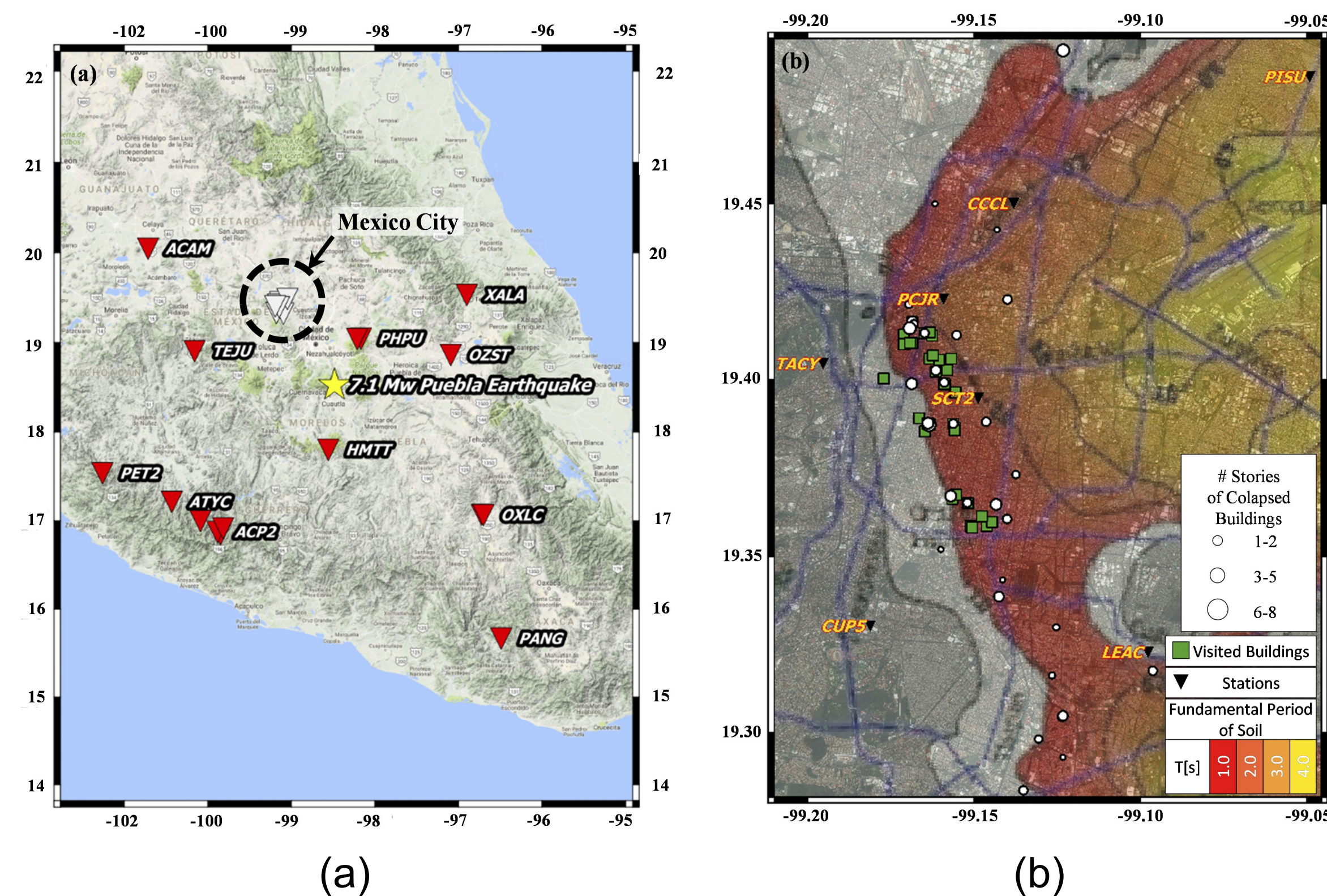


Figure 1. (a) Mw 7.1 Puebla Earthquake epicenter and locations of recording stations. (b) Map of Mexico City with fundamental soil period, displaying locations of recording stations and visited buildings.

2. Post-Earthquake Reconnaissance Mission

- Organized by the Pacific Earthquake Engineering Research (PEER) Center and the Colombian Earthquake Engineering Research (CEER) Network.
- On the ground one week after the seismic event.
- Synergy work with local practitioners and researchers.
- A total of 62 buildings were visited.

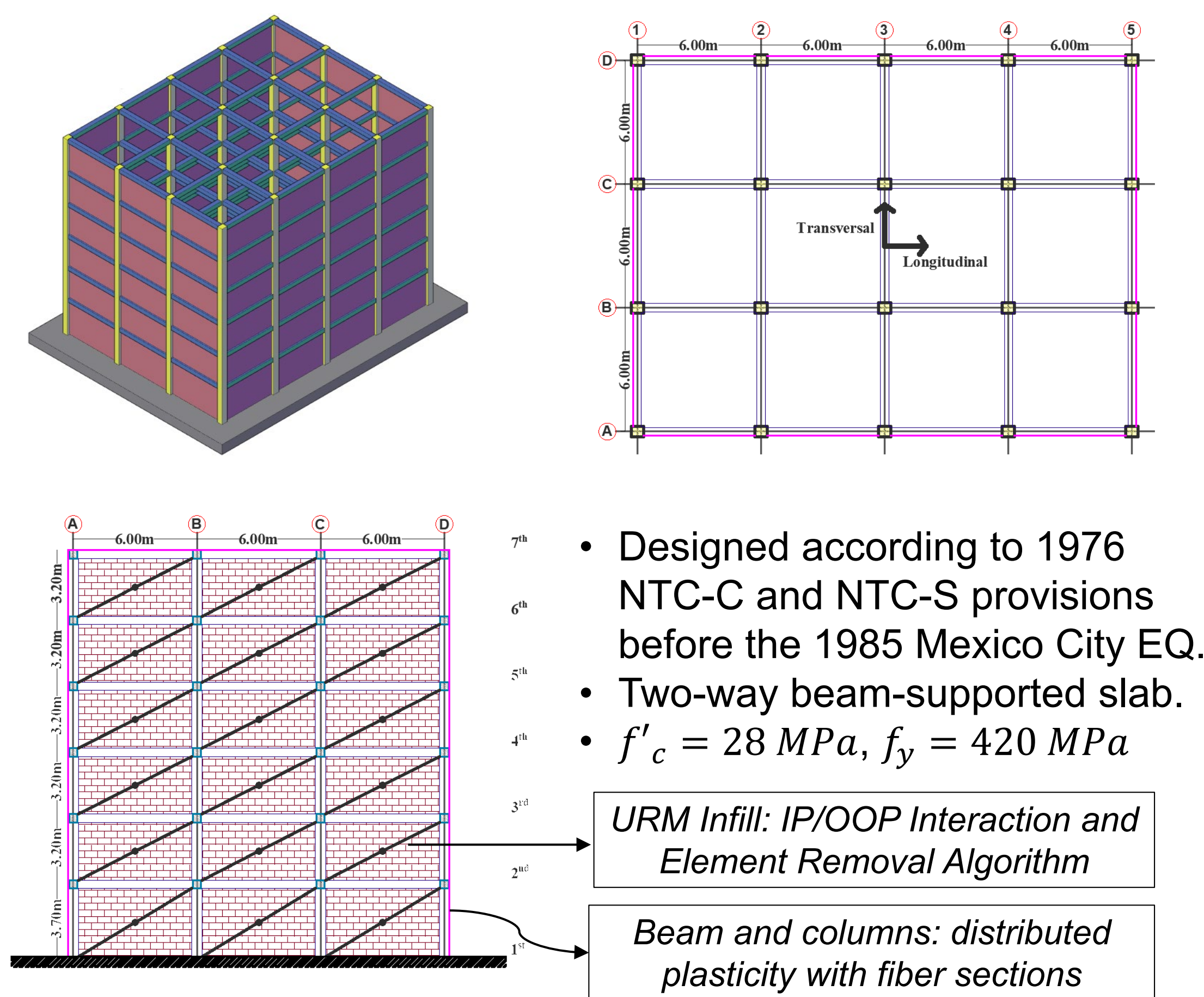
2.1 Observed Damaged



Figure 2. Examples of observed damages.

3. Case Study: Seismic Response of Archetype Building

3.1 Inelastic Model



OpenSees **Figure 3.** Building layout.

3.2 Nonlinear Time History Analyses

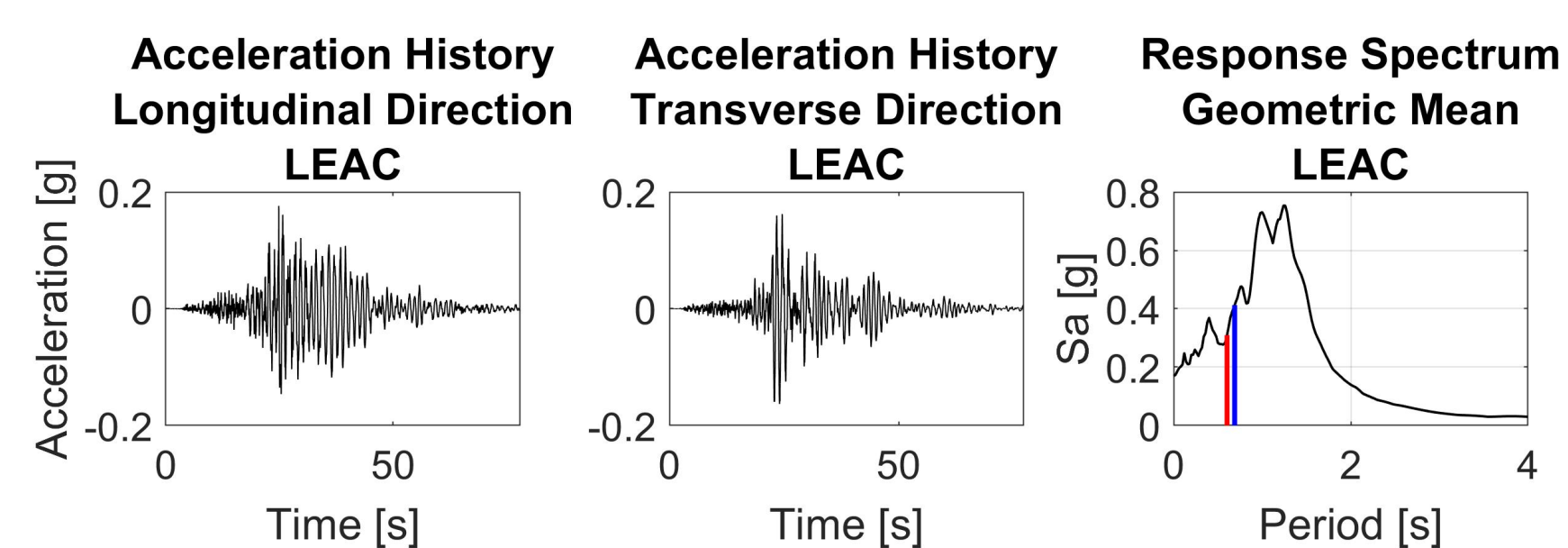


Figure 4. Recorded acceleration histories.

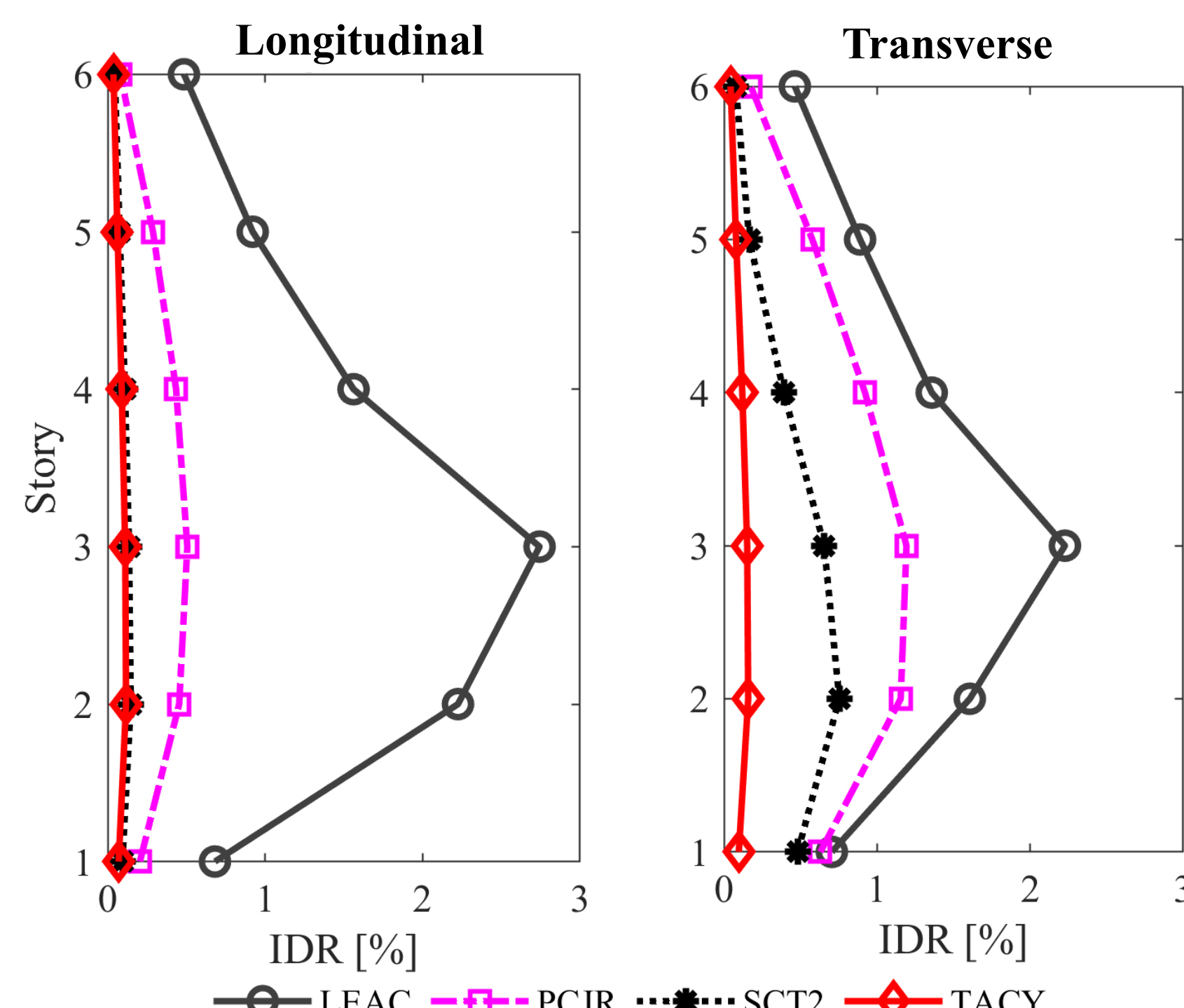


Figure 5. Peak inter-story drift ratio.

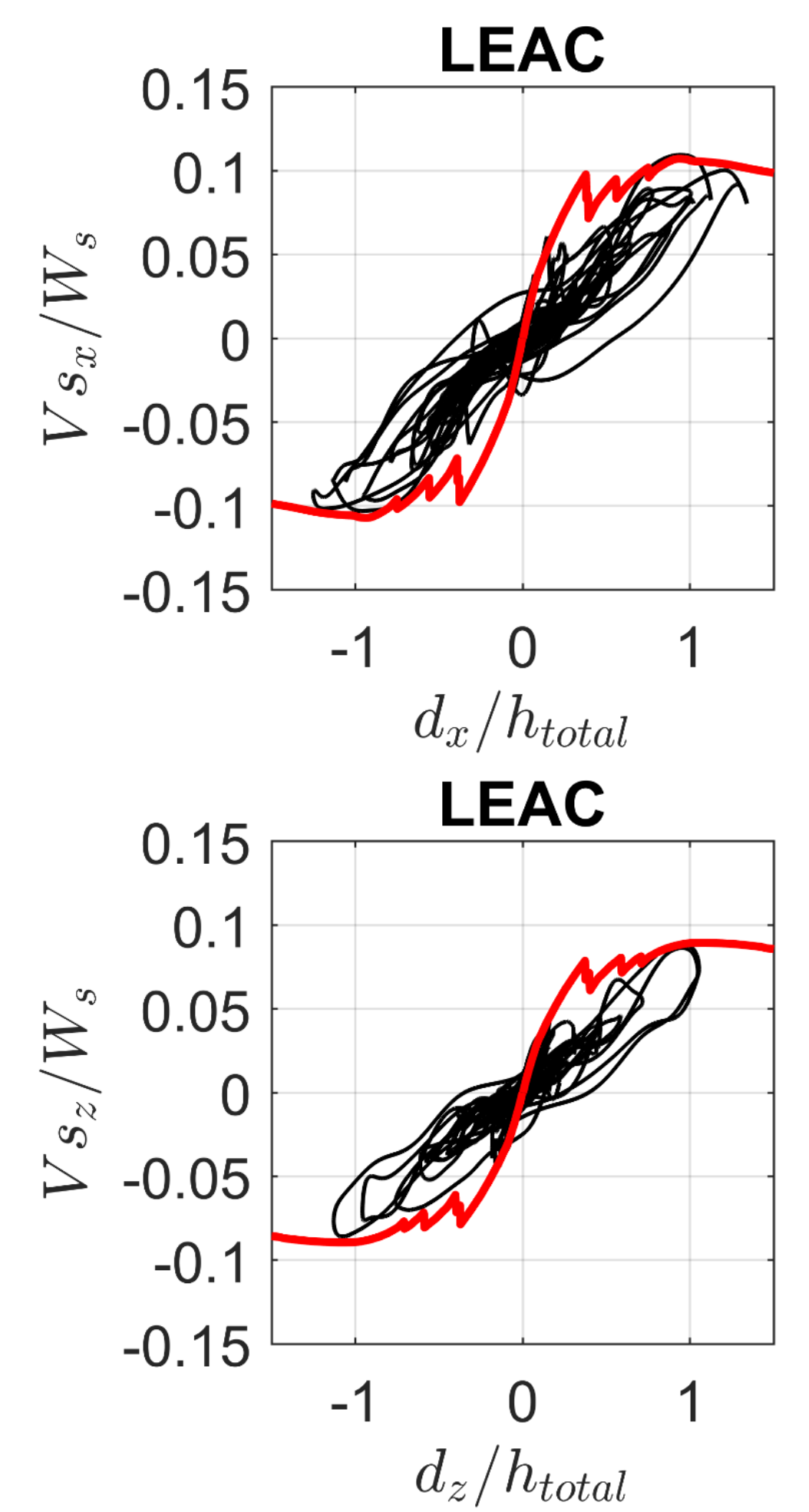


Figure 6. Roof drift versus the normalized base shear.

4. Concluding Remarks

- The IP/OOP interaction and the element removal algorithm allows to properly model the brittle behavior of the URM infill walls.
- The results of the analyses agree with the damage observed after the earthquake and explain in a reasonable manner some of the brittle failures observed.

Acknowledgements

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References

USGS. (2017). M 7.1 - 1km E of Ayutla, Mexico. Retrieved from <https://earthquake.usgs.gov/earthquakes/eventpage/us2000ar20/executive>