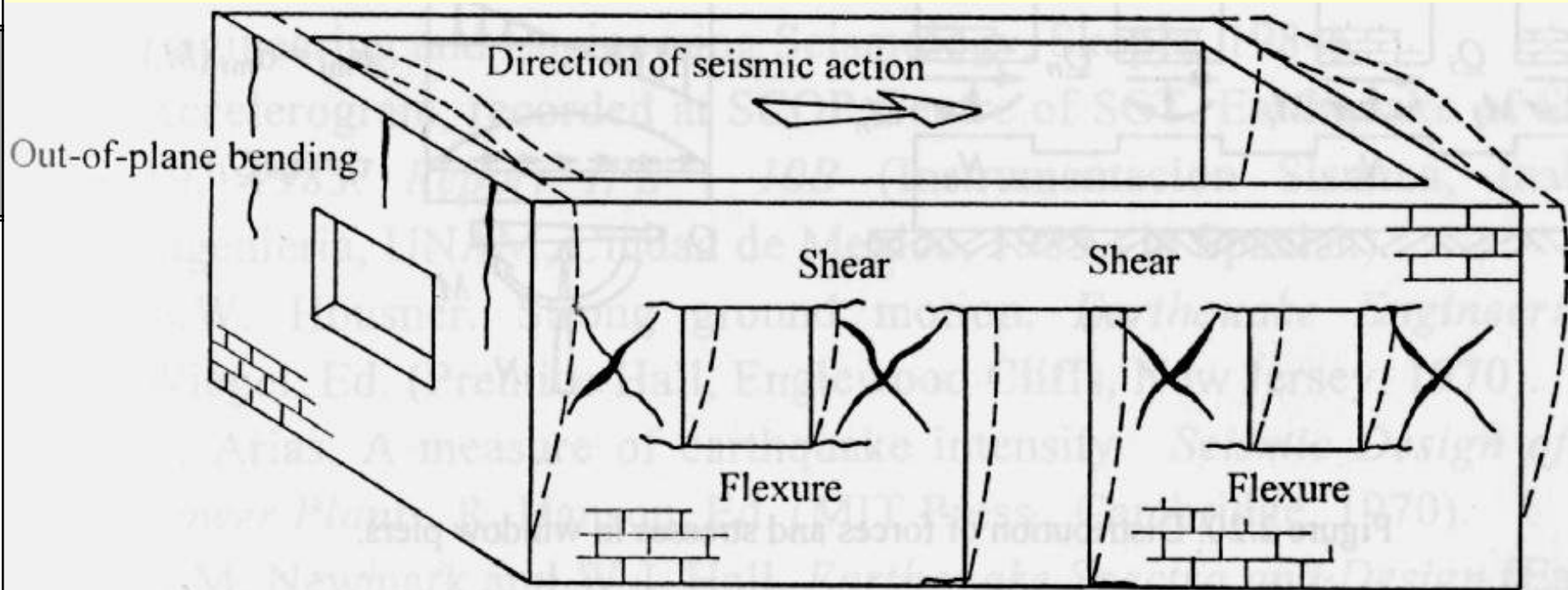


Performance of Masonry Structures During Christchurch Earthquake 2011

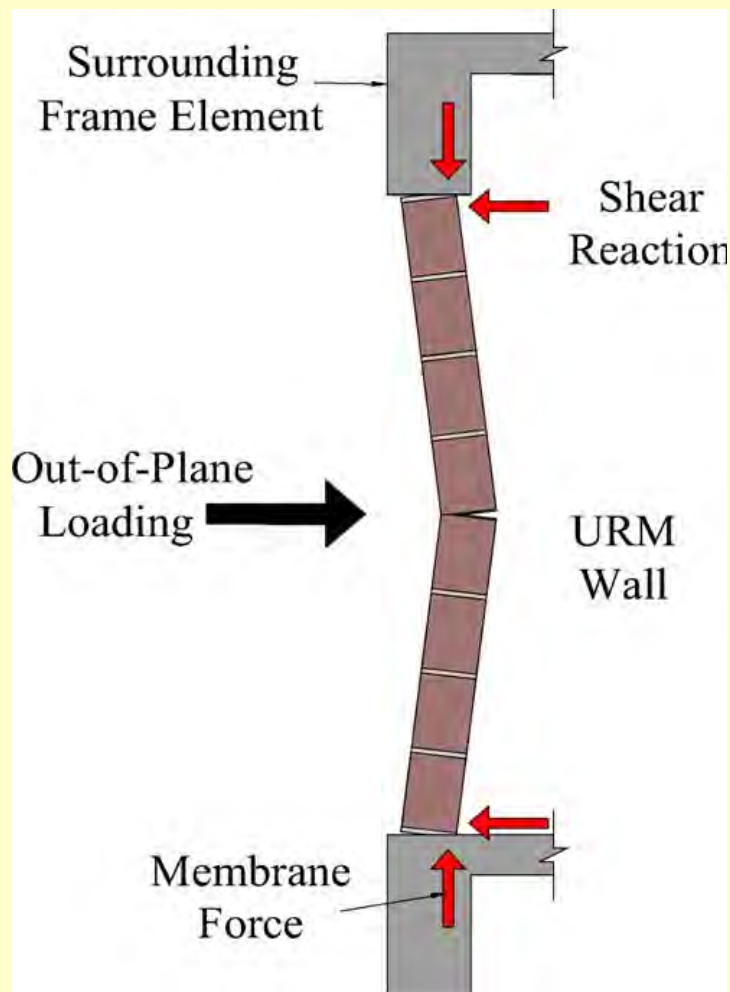
Dr. Mohamed ElGawady
Tokyo Institute of Technology



URM Walls Tend to Be Vulnerable

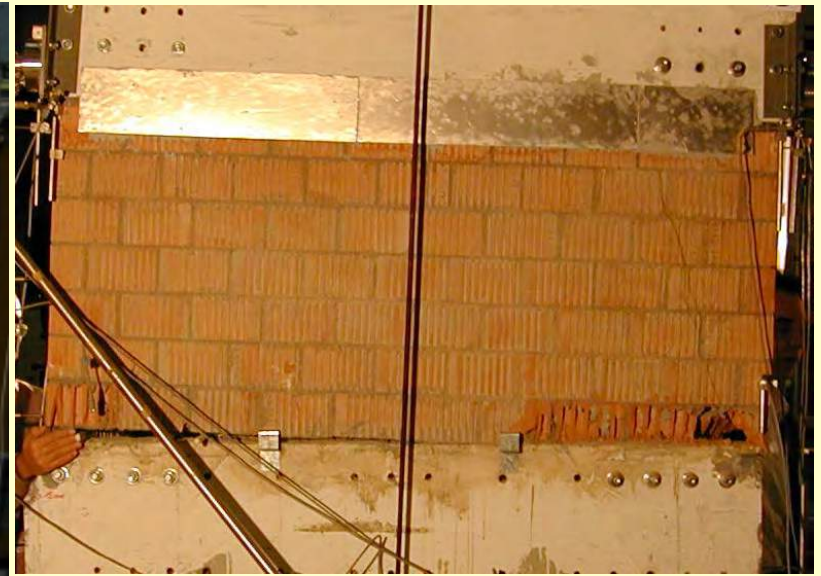


Out-of-plane Behavior of URM Walls

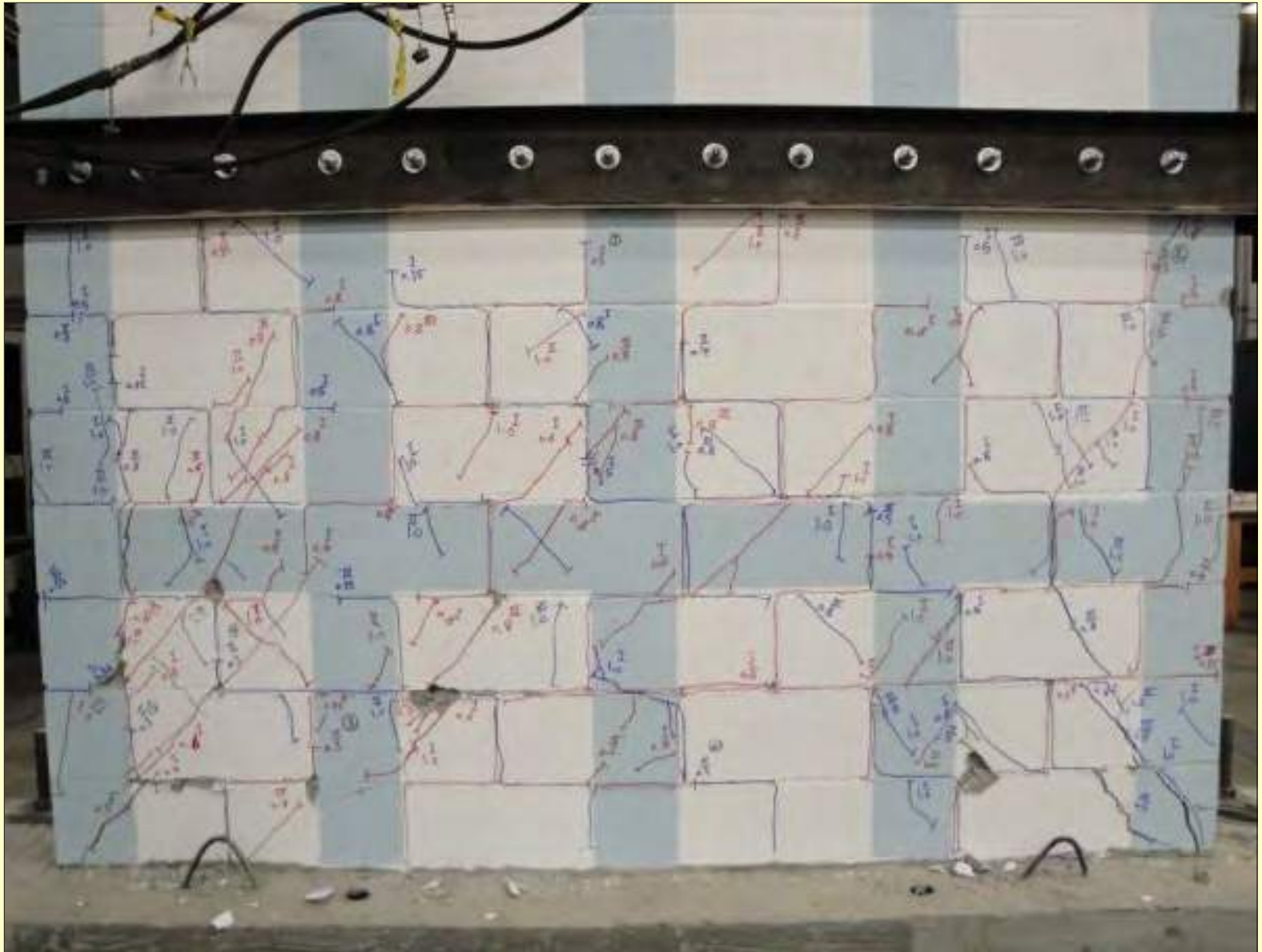


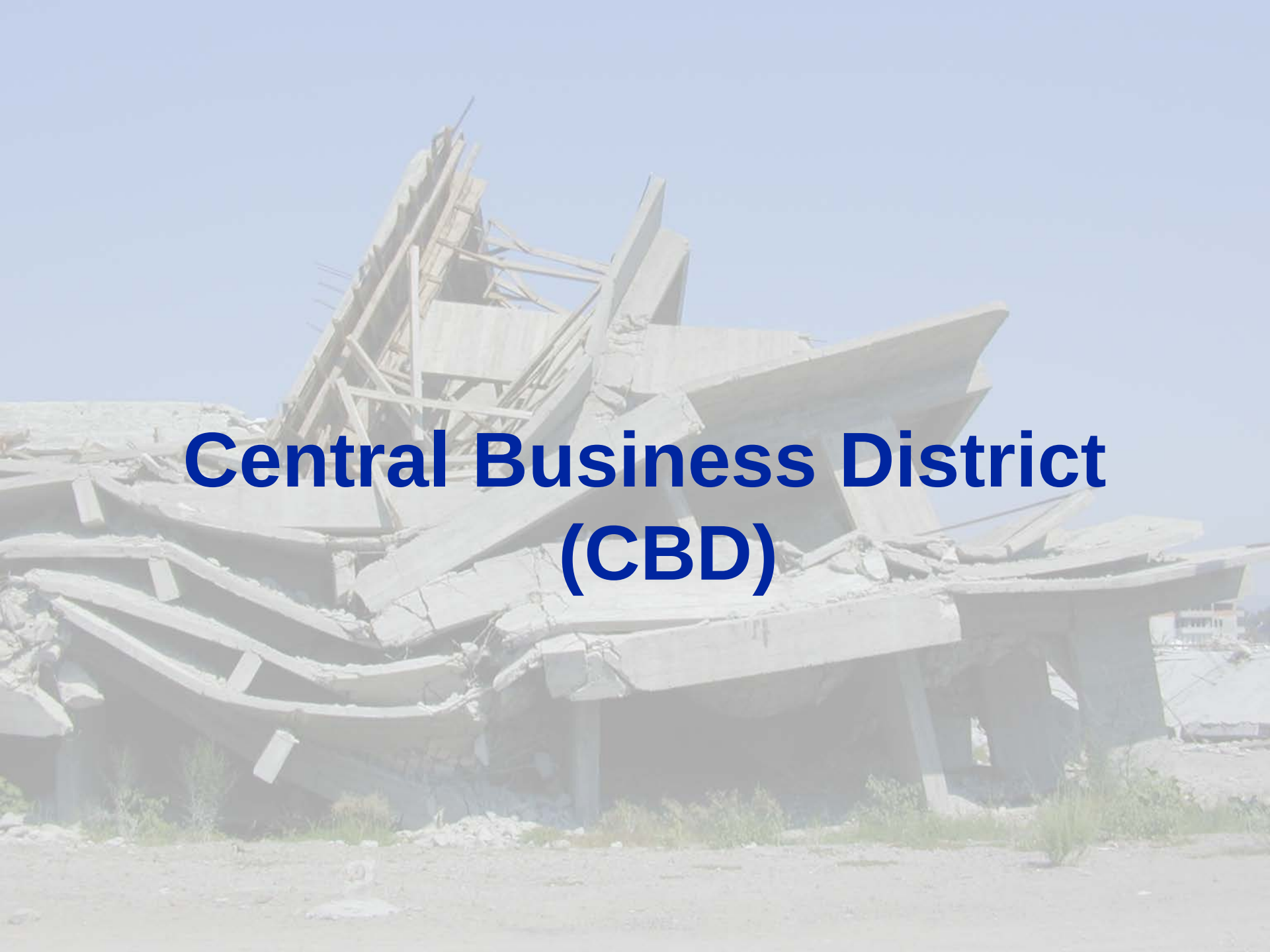
Velazquez-Dimas and Ehsani 2000

In-plane Behavior of URM Walls

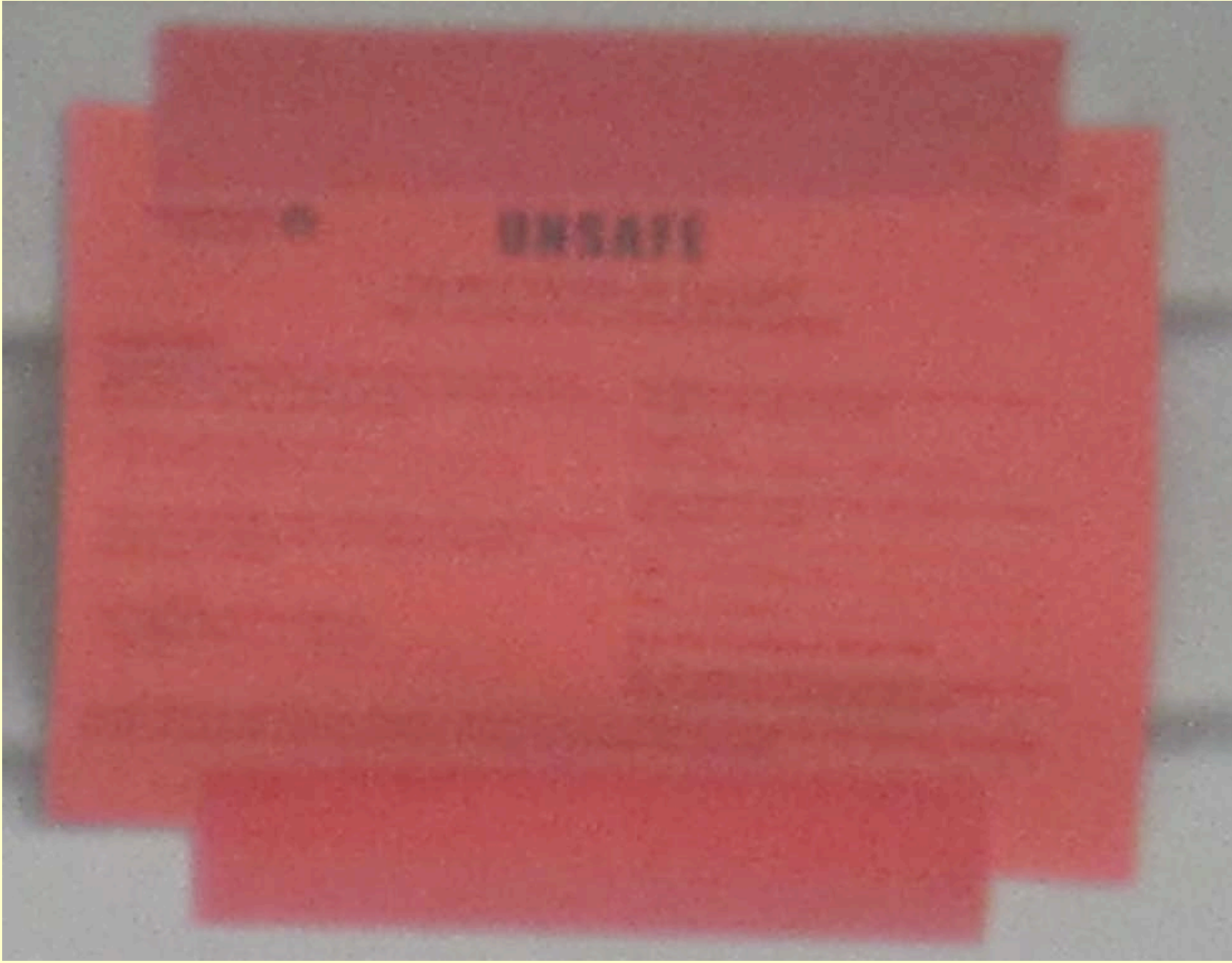


Reinforced Masonry Shear Wall



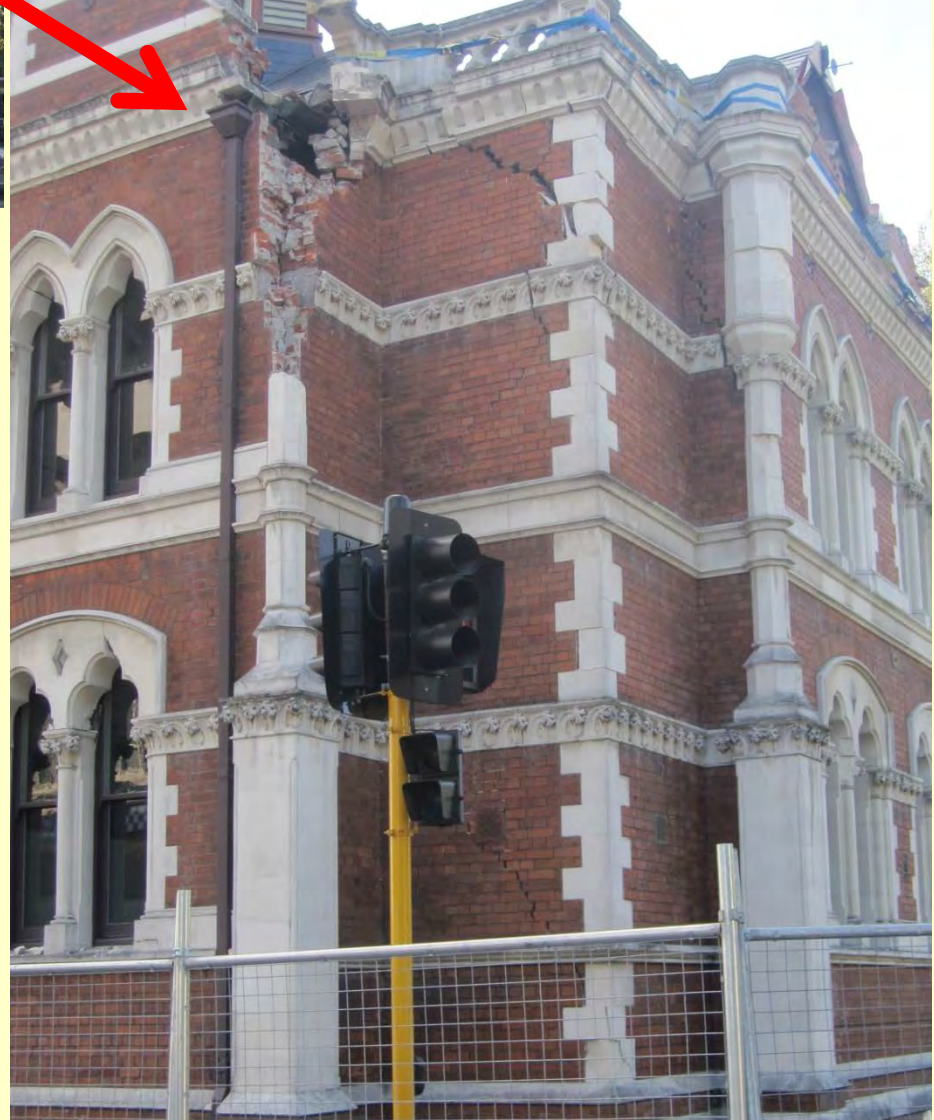
The image shows a massive concrete bridge that has suffered a catastrophic structural failure. Large sections of the bridge deck and support structure have collapsed, leaving a chaotic pile of broken concrete and exposed steel reinforcement bars (rebar). The remaining parts of the bridge are precariously balanced or hanging from the remaining supports. The scene is set in a dry, open area with some sparse green vegetation in the foreground. The sky is a clear, pale blue.

Central Business District (CBD)



**Public Library Building
Three Wythe URM**









Primary School



















The image shows a large-scale structural failure of a concrete building. The structure is heavily damaged, with large sections of the roof and upper floors collapsed. Exposed steel reinforcement bars (rebar) are visible throughout the remaining concrete framework. The debris is piled up, and the building appears to be in a state of total ruin. The background is a clear blue sky, and the foreground is a dusty, uneven ground with some sparse vegetation.

Residential Buildings













A photograph of a collapsed concrete bridge structure, likely the Cranmer Bridge. The bridge is in a state of severe disrepair, with large sections of concrete and steel reinforcement exposed and broken. The structure is tilted and crumpled, showing significant damage. The text "Cranmer Bridge Club" is overlaid in a bold, blue font across the center of the image. The background is a clear blue sky, and the foreground is a dirt and gravel area with some sparse vegetation.

Cranmer Bridge Club

























Thank you for your attention