EXPERIMENTAL STUDIES ON RC FRAME WITH URM INFILL

THE UNIVERSITY OF TOKYO, INSTITUTE OF INDUSTRIAL SCIENCE,
NAKANO LABORATORY

Nakano Laboratory

Background

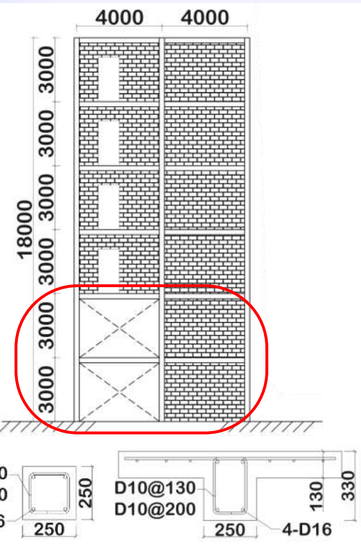
- The first building code “Bangladesh National Building Code 1993” was enforced as law in 2006.
- Low strength of concrete and smaller cross-sectional area of beams and columns than required.
- Very high axial load ratio in columns.
- 90° hooks in stirrups and ties.
- Straight anchorage in beam-column joints.
- Effect of brick infill walls on seismic performance is not considered in design.
- Proper evaluation of seismic performance is required for future retrofitting.

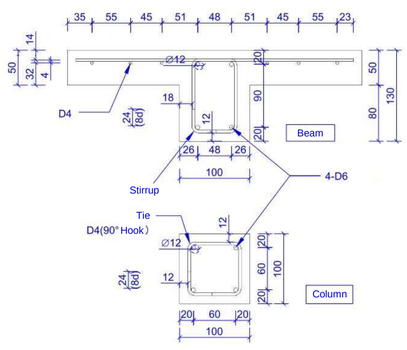

Spectrum Factory (2005)


Rana Plaza (2013)

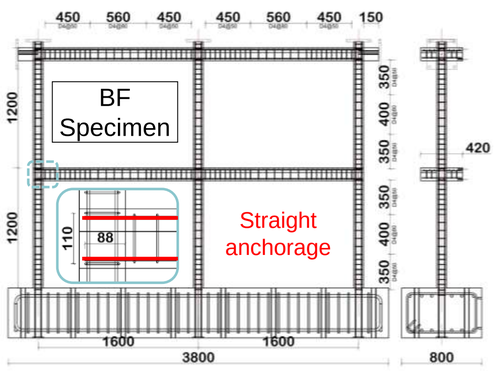
Design of Specimens

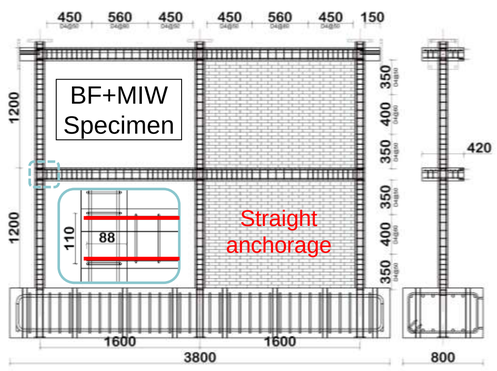
- A prototype building is assumed based on survey and interviews of experts and local engineers in Bangladesh.
- The model building is scaled to 1/2.5
- Type of specimens
  -Bare Frame (BF)
  -Bare Frame with URM infill wall (BF+MIW)



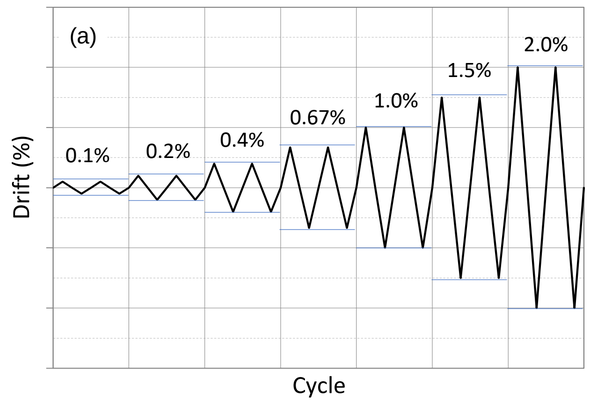


Material properties				
	Concrete	BF	1F	4.74 MPa
			2F	8.20 MPa
		BF+MIW	1F	5.22 MPa
			2F	8.65 MPa
	Longitudinal bars (yield)			375 MPa (SD 295)
	Brick			30.3 MPa
	Joint mortar			9.04 MPa

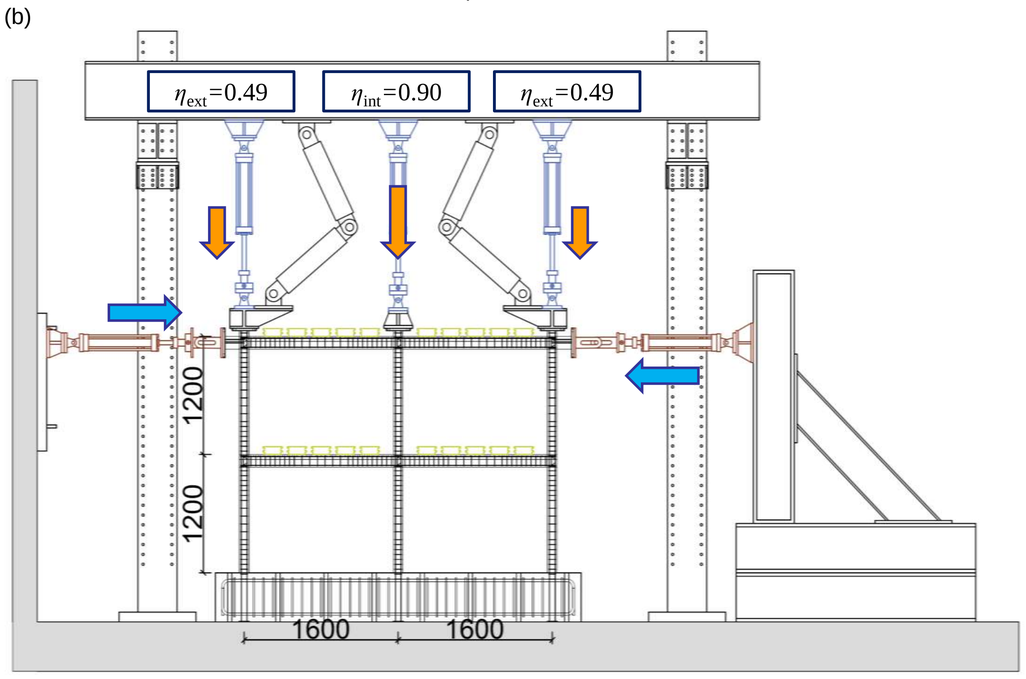




Test Setup and Loading History



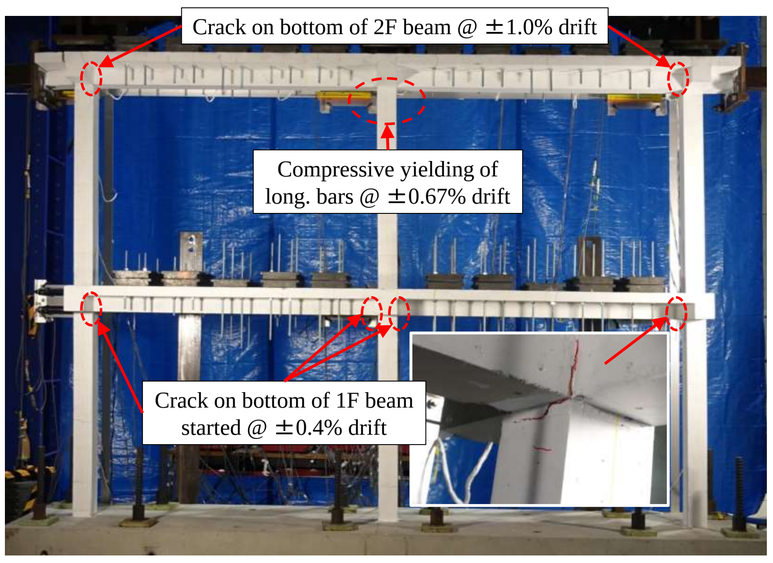
(b)

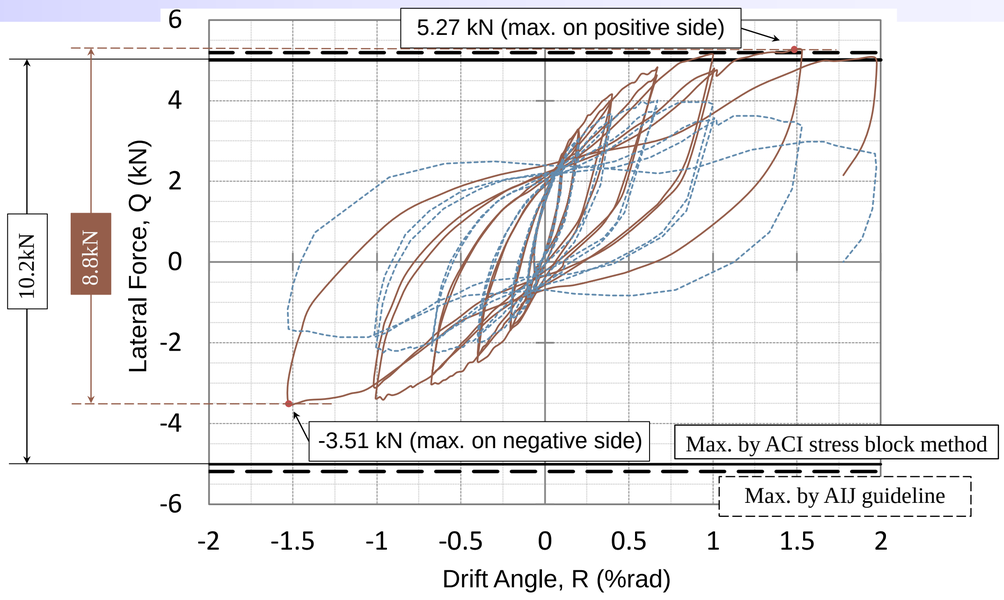


(a) Lateral loading cycle; (b) Experimental setup

BF Specimen

- Due to straight anchorage of beam longitudinal bars to beam-column joint, pullout occurred and no resisting moment at the part was observed.





BF+MIW Specimen

- Wall rotation and column yielding in tension was observed, and finally column punching shear failure and wall sliding failure occurred simultaneously.