

# Y. NAKANO LAB.

## Safer Buildings against Earthquakes and Tsunamis



Department of Fundamental Engineering

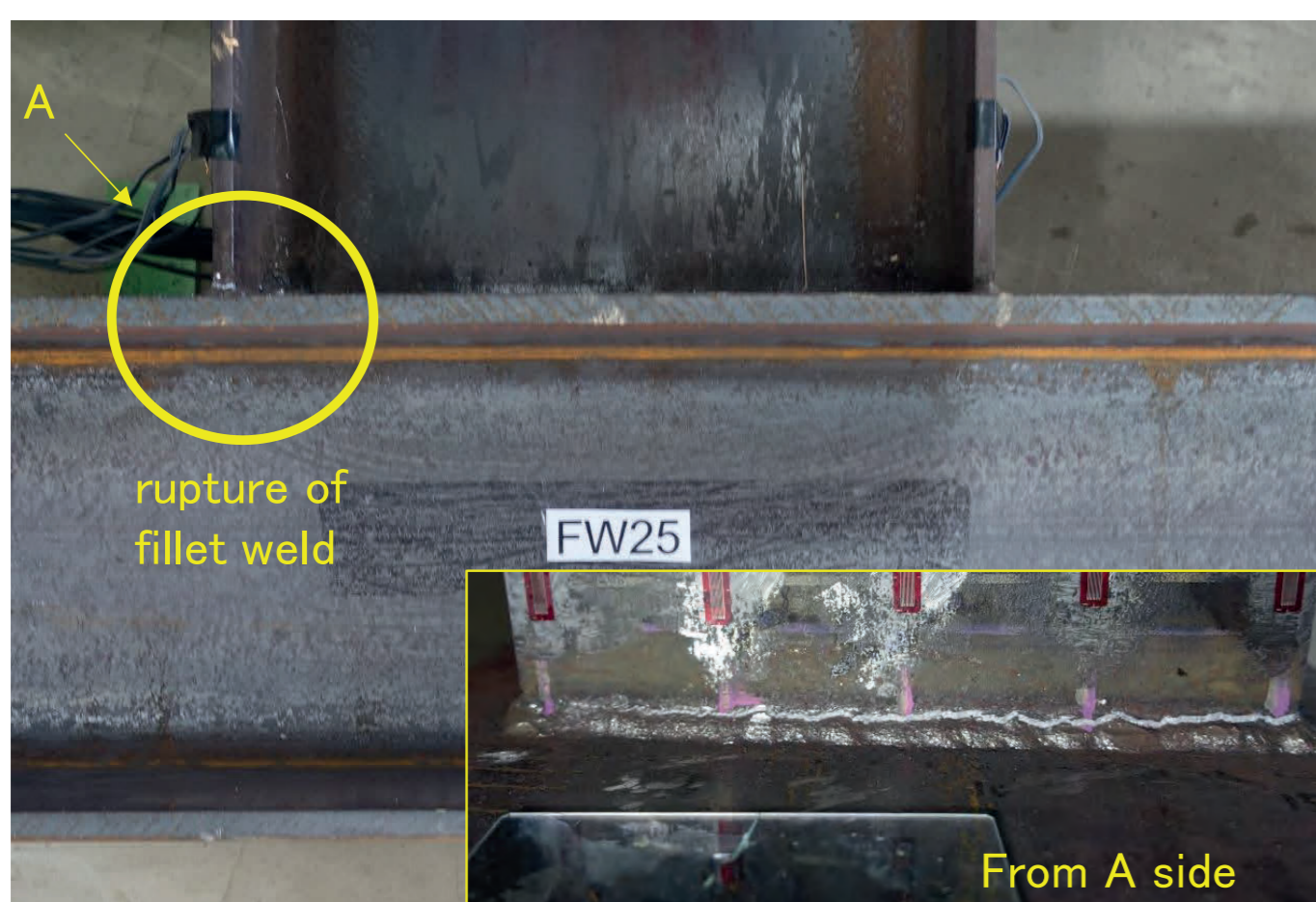
Earthquake Engineering & Structural Dynamics

Department of Architecture, Graduate School of Engineering

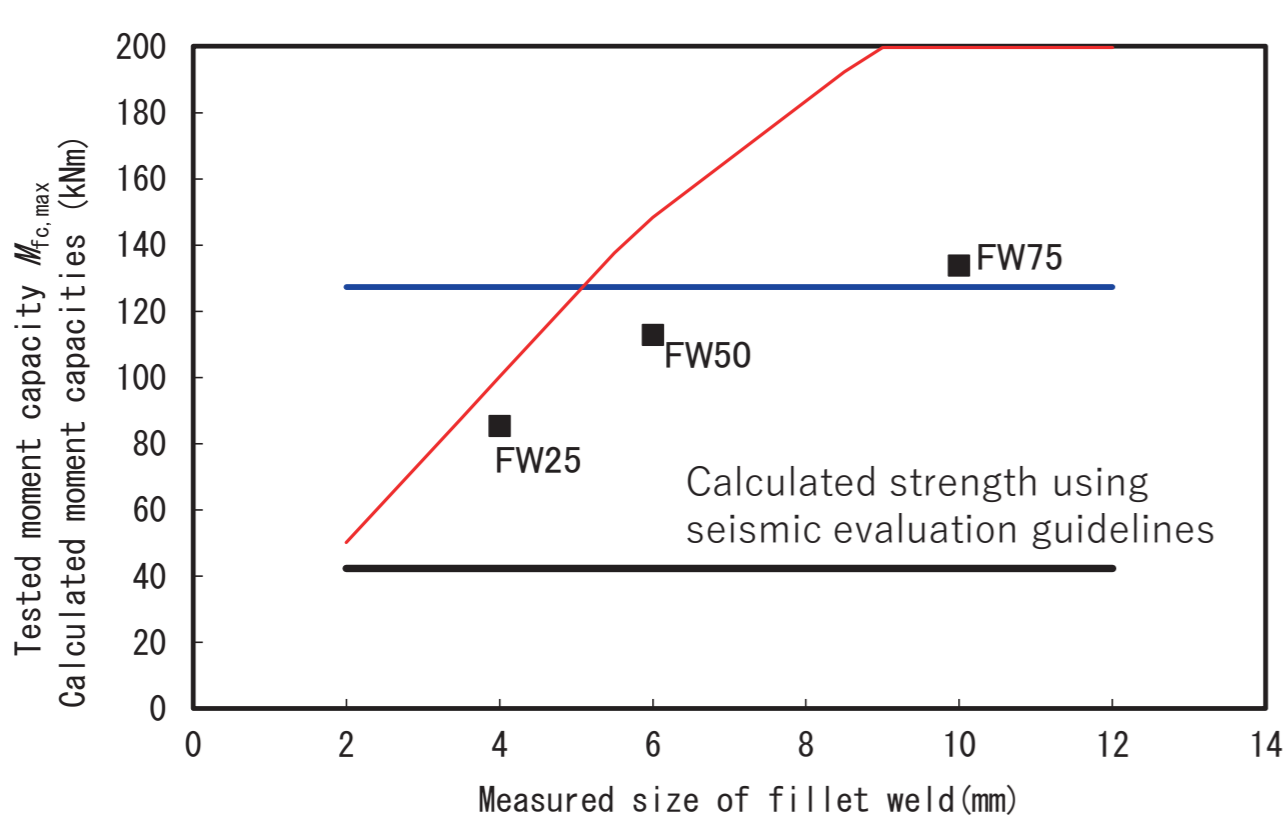
<http://sismo.iis.u-tokyo.ac.jp/index-e.html>

# Performance Evaluation of Building Structures against Earthquakes and Tsunamis

- **MEMBERS:** Performance Evaluation of Beam-column Joint of Steel Structures Designed by Old Codes
- **SUB-ASSEMBLAGE:** Out-of-Plane Shaking Table Test of Masonry Wall Infilled RC Frames
- **OVERALL STRUCTURE:** Response Evaluation Method of Buildings due to Waterborne Debris Impact Load
- **INTERNATIONAL COOPERATION:** Project for Technical Development to Upgrade Structural Integrity of Buildings in Densely Populated Urban Areas and its Strategic Implementation towards Resilient Cities

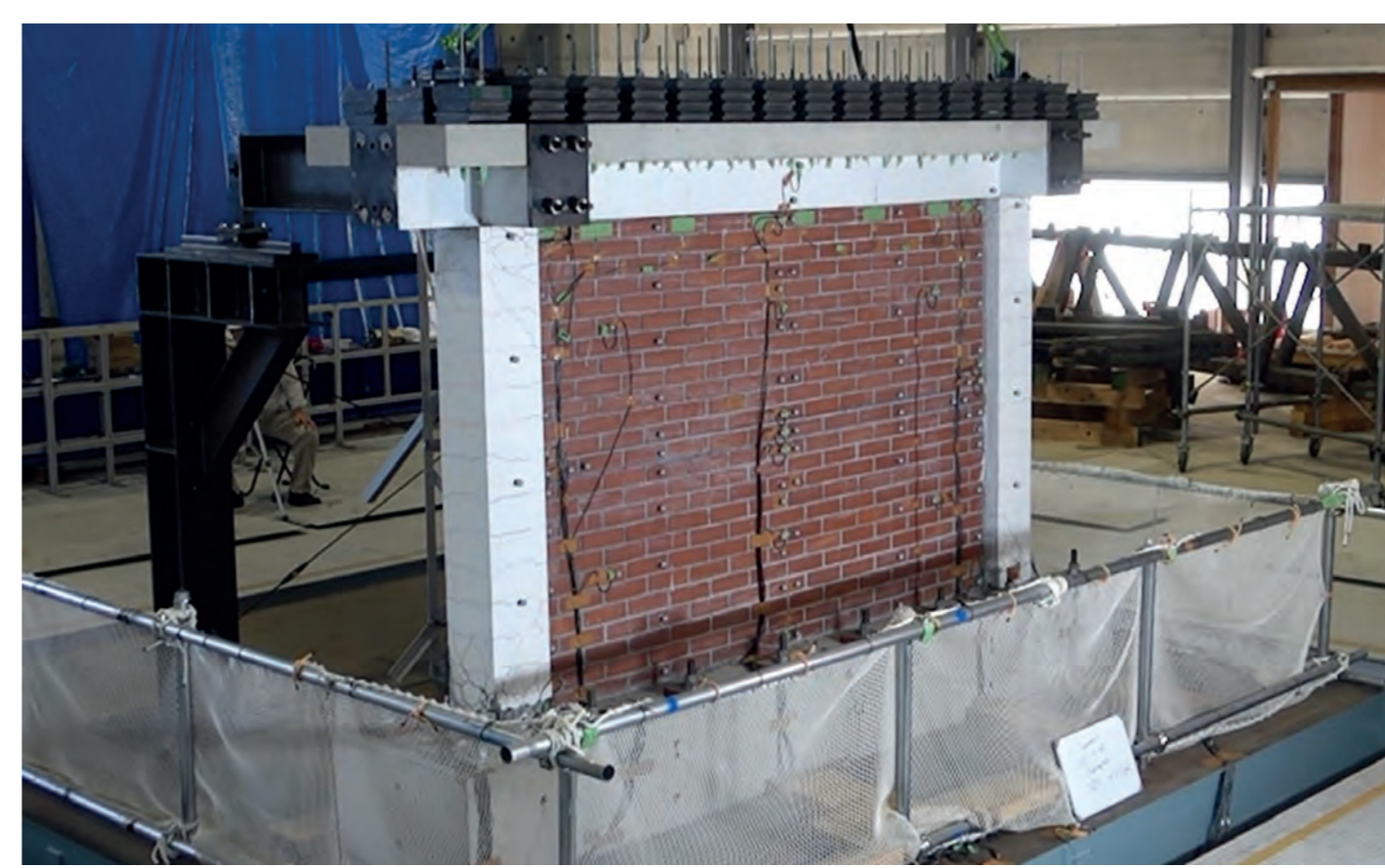


Performance evaluation by structural test

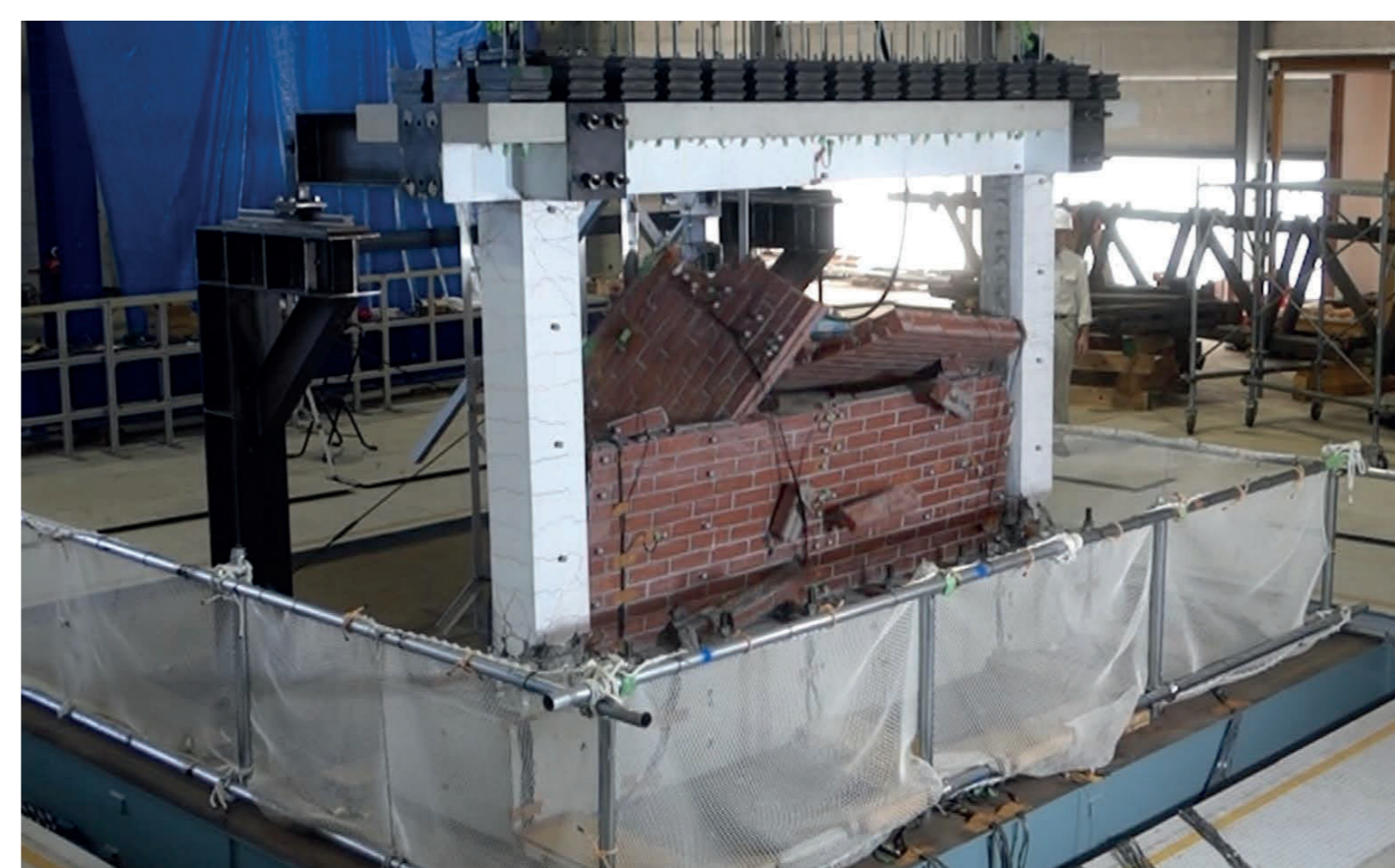


**Weld ruptures determined the performance of beam-column joint, however, more than double of calculated strength (ref. seismic evaluation guidelines) were observed.**

Comparisons of tested/calculated strength



**Out-of-plane shaking table test was performed after applying in-plane damage for understanding influence of prior in-plane damage.**



Masonry wall collapse by shaking table test



Ship's drifting behavior at Hachinohe bay in 2011

**Drifting ships may cause severe damage of reinforced concrete buildings due to their collision**



Collision Test and Collapse of Reinforced Concrete Frame

### Science and Technology Research Partnership for Sustainable Development (SATREPS)

Project for Technical Development to Upgrade Structural Integrity of Buildings in Densely Populated Urban Areas and its Strategic Implementation towards Resilient Cities

#### Joint Research Group

##### Japan

- IIS, The Univ. of Tokyo
- Tohoku Univ.
- Osaka Univ. etc.



##### Bangladeshi Representative

- Housing and Building Research Institute
- Public Works Depart.
- Univ. of Asia Pacific etc.

**Technologies for enhancing structural resilience of buildings in Dhaka and their effective implementation schemes are proposed.**

### Publication of guidelines and dissemination seminars



### Testing on RC column@BUET

