Quick Recovery Performance of Unbonded Post-Tensioned Precast Concrete Walls

T. Obara¹, H. Watanabe², T. Kuwabara¹ and S. Kono¹

¹Tokyo Institute of Technology, Yokohama, Japan
²Building Research Institute, Tsukuba, Japan

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Introduction

Fig. 1 Limit States and Shear failure in lightly RC walls

Tohoku, NILIM (2011)

Controlling Factor

Residual Drift Angle
Residual Cracking

Concrete in compression side
PT tendon
Longitudinal Reinforcement

Serviceability Limit State: No repair necessary
Reparability Limit State I: Small-scale repair needed
Reparability Limit State II: Large-scale repair
Safety Limit State: Repair is difficult
The main objective is to evaluate damage level of rocking walls and quantify limit states rocking walls

- **Serviceability Limit State**
- **Reparability Limit State I**
- **Reparability Limit State II**
- **Safety Limit State**

This paper shows damage evaluation of two unbonded post-tensioned precast concrete walls and two reinforced concrete walls cast-in-site. It also discusses drift angle for four limit states.
Experimental Program

Loading System and Configuration of Rocking Specimen
Experimental Results

Shear Force (Q) (kN) vs. Drift Angle (R) (%)

- **Drift Angle for Limit States**
  - **RC Wall**
    - 0.25% Con.
    - 0.041% Con.
  - **Rocking Wall**
    - 1.50% Con.
    - 0.572% Con.
    - 0.663% Con.
    - 1.93% Con.

Crack Pattern at R=1.0% drift
Conclusions

- The rocking walls showed satisfactory seismic performance with minor damage and less residual drift than RC walls.

- Rocking wall reached the different limit states mainly due to exceeding concrete compressive damage criteria.

- The large drift ratio of each limit state in rocking walls showed high damage controlling ability in comparison to RC walls.
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**Today Poster Session:**

- **Time:** 5:15 – 7:00 pm
- **Room:** Pasadena (Exhibit Hall)
- **Poster location:** Number 393