Research on External Force and Experiment Method contributing to Structural Performance Verification for Building Structure Members

WAKIYAMA Yoshio (Dr. Eng.), Senior Researcher
FUJIMOTO Hidekazu, Head
Evaluation System Division, Research Center for Land and Construction Management

(Key words) Non-Structural members, Structural performance verification, External force evaluation, Experiment method

1. Background of research

Seismic performance of buildings has been improving with the development of earthquake resistant performance evaluation technology through many earthquake disasters, and damage to building structures by earthquake vibrations have been decreasing. On the other hand, damage prevention for nonstructural building members, such as nonstructural components, is subject to decrease earthquake damage. There is more damage observed that is assumed to affected not by the story drift due to structural deformation but by the out-of-plane deformation and inertia force to nonstructural component due to deformation/vibration of structural/nonstructural members. In order to prevent such damage, appropriate evaluation of external force to nonstructural component and appropriate testing method for structural verification are required to be studied with regard to the observed damage.

Photo: Damage assumed to be affected by out-of-plane vibration.

2. Contents of research

This research is aimed to provide technical data for structural performance verification of building members through evaluating external force to building members by earthquake vibration and examining testing methods with the evaluation considering the nonstructural damage observed in recent earthquakes. Of research subjects for the three years from 2013 to 2015, the following contents are planned.

- Survey on testing method for structural performance evaluation for building structural members at home and abroad.
- Examination of experimental method with full scale specimen.
- Implementation of full scale experiment for subject building member.
- Summary of the points for structural performance verification.

The anticipated research objects of this research are nonstructural components, such as AAC(Autoclaved Aerated Concrete) external wall, large sheet glass and tall partition, which have possibilities to be damaged by out-of-plane vibration in future earthquakes.

3. Research schedule

For fiscal 2013, we carried out study on experimental methods at home and abroad, configuration of an object for a full scale experiment (large sheet glass) considering damage in the past and preparation of steel support frames for the next year. For fiscal 2014, we will carry out full scale experiment with a shaking table. For the final fiscal year, the points will be summarized for structural performance verification on external force evaluation, experimental method and the like.