

Arrangement and assessment towards earthquake observation and earthquake motion of architectural structure

AZUHATA Tatsuya (Dr. (Science)), Head
 ARAI Hiroshi (Dr. (Engineering)), Senior Researcher
 Building Department Structural Standards Division

INOUE Namihiko, Senior Researcher
 IWATA Yoshihiro (Dr. (Engineering)), Senior Researcher
 Standards and Accreditation System Division

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1. Introduction

To ensure safety of architectural structure for a great ocean trench earthquake, it is important to assess earthquake motion that impinges on architectural structure. Therefore, as part of MILIT general technology development, earthquake observation has been done for earthquake motion assessment regarding various architectural structure from low rise to super high rise. Arrangement of record / analysis result of 5-story box frame type reinforced concrete construction is indicated here as an example.

2. An example of arrangement of record and analysis result

Figure 1 is an outline of installation of seismograph. in this research, the seismograph is installed outside of architectural structure to demonstrate the relationship between 『earthquake motion』 of the ground level and 『earthquake load』 that impinges on architectural structure.

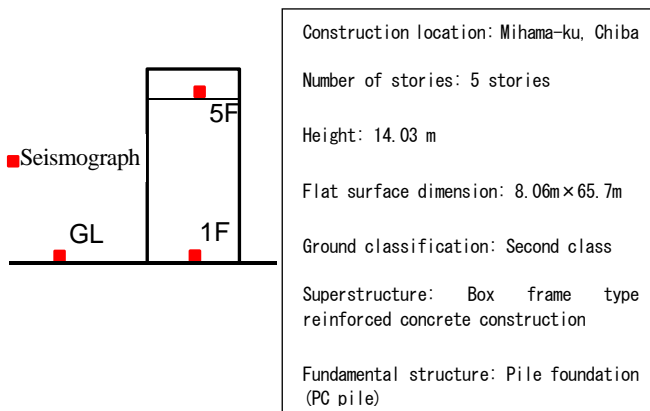


Figure 1 Outline of target architectural

Figure 2 is a Fourier spectrum ratio from earthquake record of The 2011 off the Pacific coast of Tohoku Earthquake

(main shock), and Figure 3 a comparison of maximum acceleration observed at first floor and 5th floor during main shock and aftershock. The following will be understood by Figure 1 and 2.

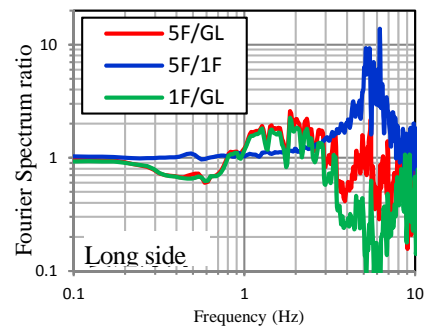


Figure 2 fourier spectrum ratio (The 2011 off the Pacific

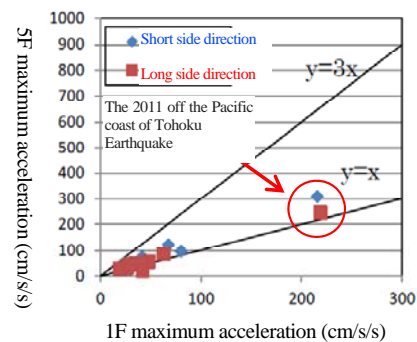


Figure 3 Maximum acceleration at the 1st floor and 5th floor (main shock and aftershock)

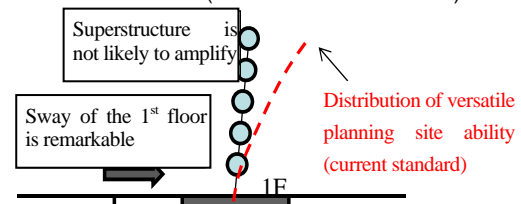


Figure 4 Assumed behavior during earthquake from the record and Earthquake assessment

Research Trends and Results

(1) Fourier spectrum ratio 5F/GL (red) and 1F/GL (green) are almost conformable with neighborhood of predominant frequency (approx. 2Hz) (Figure 2).

(2) Maximum acceleration of the 1st floor and 5th floor is also almost conformable (Figure 3).

(3) From (1) and (2), this architectural structure is assumed that it presented the behavior as it's indicated in Figure 4, and earthquake load in superstructure, it is thought that it is less likely to amplify than assessing on the assumption that it is foundation fixing.

3. Conclusion

Today, earthquake record of architectural structure has been arranged and assessed by type of ground, story and structure. It helps streamlining of earthquake resistant design of structure by being able to accurately assess the relationship between earthquake motion on the ground and earthquake load that impinges on architectural structure.