

Facilities in Buildings (1)

Summary

- Heavy rains associated with Typhoon No. 19 that hit Eastern Japan in 2019 caused **inflows of rainwater into the high-voltage substation equipment** installed on the basement floors of high-rise condominiums in Tokyo and also caused **blackouts** in these buildings. These blackouts caused damage to the buildings, in addition to which, **elevators, water-supply facilities and other essential utilities became unusable for some time.**
- In light of the occurrence of this damage from flood disasters to such buildings, **the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and the Ministry of Economy, Trade and Industry (METI) jointly inaugurated a “Study Group on Ideal Approaches to Measures against Flood Disasters at Electricity Facilities in Buildings,”** bringing together academic experts, representatives of related industrial associations and others as members, and the study group held discussions on ideal approaches to taking measures against flood disasters.
- Based on the results of the call for public comments, the study group compiled **“Guidelines for Measures against Flood Disasters at Electricity Facilities in Buildings” in June 2020,** and MLIT and METI **proactively raised awareness of the guidelines among related industrial associations and other organizations.**

Outline of the study group

Meeting schedule

- Four meetings were held in total from November 2019 to June 2020.
(Among these meetings, the fourth meeting was held based on written discussion.)
(A call for public comments opened from late April to early May 2020.)

Members of the study group

Experts:

- ◎ Nakano Yoshiaki, Professor, Institute of Industrial Science, University of Tokyo
- Seike Tsuyoshi, Professor, Graduate School of Frontier Sciences, University of Tokyo
- Moriyama Shuji, Professor, College of Engineering, Nihon University
- Toda Keiichi, Professor, Civil and Earth Resources Engineering, Graduate School of Engineering, Kyoto University
- Shigekawa Kishie, Professor, Graduate School of the Environment and Disasters, Tokoha University

Representatives of related associations:

Stakeholders in the construction industry, owners and managers of buildings, stakeholders in the electricity facilities industry, officials of administrative organizations and others

Stakeholders of research institutes:

Representatives of the National Institute for Land and Infrastructure Management (NILIM), the Building Research Institute and the National Institute of Technology and Evaluation (NITE)

Note: The sign “◎” refers to the chair of the study group; honorifics are omitted.

Outline of the guidelines (1)

1. Target scope of the guidelines

- Buildings in which high-voltage substations and other similar equipment is installed
- Approaches to constructing new buildings, those to renovating existing buildings, etc.

2. Setting the goals

- Construction clients, owners and managers of buildings should receive support from professional engineers and set the goals.
- They should research the facts related to the following items, take into consideration the need for keeping facilities functional, estimate flood depths, flood duration and other factors and, based on these data, base the goals they set on the scale of flood disasters that are expected, such as “a flood depth is estimated to be XXcm.”
 - ✓ Areas estimated to be affected by flood disasters, which the national and local governments have determined and published
 - ✓ Flood hazard maps prepared by municipalities (estimating a flood which is likely to occur at an average frequency of once in 1,000 years)
 - ✓ Topographical information, e.g., topographic charts (ascertaining detailed information on target premises, e.g., risks of flood disasters)
 - ✓ Information on the maximum rainfall in the past, records of flood disasters, etc. (taking into consideration flood and other disasters occurring at relatively higher frequencies)
- They should set the goals for measures against flood disasters necessary for keeping building facilities functional in order to respond to the scales of floods that have been estimated (such as selecting specific sections in a target building where flood disasters should be prevented, e.g., residential areas)

Overview of the Guidelines for Measures against Flood Disasters at Electricity Facilities in Buildings (2)

Outline of the guidelines (2)

3. Specific efforts involving measures against flood disasters

The following measures should be taken comprehensively in light of the goals set and the current situations of the respective target buildings.

(1) Installing electricity facilities in locations with lower risks of flooding

- Installing electricity facilities on upper floors

(2) Measures for preventing flood water from entering the interiors of target buildings

Setting “flood prevention lines” on the perimeter and other areas surrounding target buildings and integrally taking the following measures for protecting facilities inside the lines from all estimated flood pathways.

Measures against flood disasters to be taken at entrances or exits, etc.:

- Raising mounds
- Installing water stops, water prevention doors and sandbags

Measures against flood disasters to be taken at openings of buildings:

- Installing water stops and other equipment at the areas around drainage channels;
- Installing air vent openings and other openings at higher elevations than estimated flood depths; etc.

Measures against back streams and overflow streams of water:

- Taking measures to prevent reverse flow of water from sewerage (e.g., installing valves)
- Taking measures for preventing inflows of water from water reservoirs (e.g., taking measures to ensure manholes are tightly closed)



(3) Measures for preventing flood water from entering rooms and other locations in which electricity facilities are installed

On the assumption that flooding could occur in the areas inside the flood prevention lines, the following measures should be taken.

Zone-based measures:

- Developing zones in which flooding should be prevented by e.g., installing water prevention doors
- Filling through-holes of pipes and other openings with water sealing materials

Measures for electricity facilities:

- Raising the elevation at which electricity facilities are installed
- Introducing electricity facilities with high water-proofing properties

Measures for reducing the amount of flood water:

- Installing water reservoirs to absorb rainwater and other water from the areas inside flood prevention lines to the reservoirs

4. Measures for early recovery of electricity facilities

The following measures should be taken at electricity facilities to prevent damage during floods or other potential and unforeseen disasters.

Ordinary efforts to be taken:

- Developing contact networks between owners and managers of buildings and stakeholders of electricity facilities;
- Preparing diagrams and illustrations that are relevant to electricity facilities; etc.

Efforts to be taken during and after the occurrence of floods:

- Examining water-discharging operations and methods of cleaning, inspection and recovery of target facilities;
- Carrying out recovery operations; etc.

Note: Collection of references

This collection was formulated as an appendix to the guidelines and presents a variety of case examples of the model efforts taken for buildings.

Case example of a building with electricity and other facilities installed on the rooftop (office building in Osaka City)

