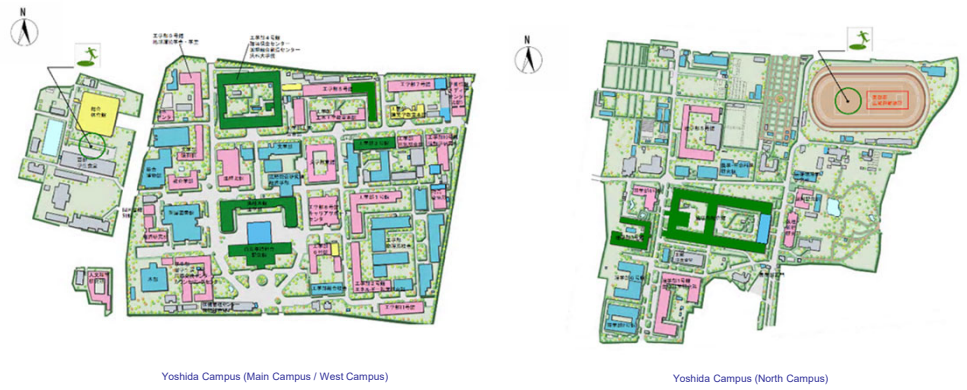
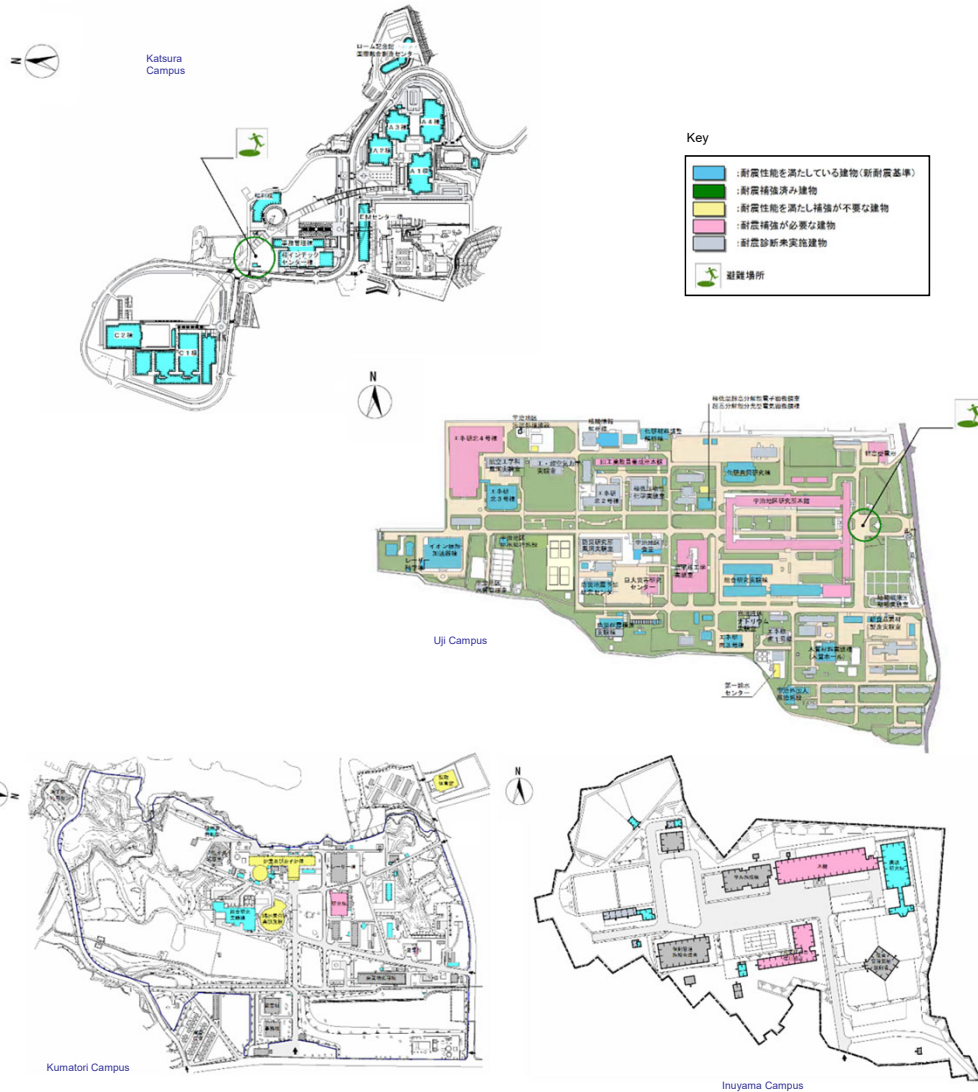


Kyoto University's "Seismic Retrofitting Promotion Policy" is available to download from the university website.

<https://www.kyoto-u.ac.jp/ja/about/foundation/safety/aseismatic>

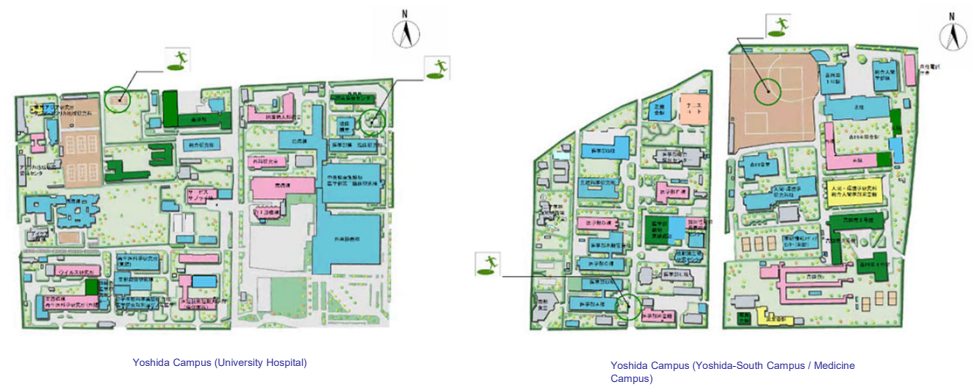


Kyoto University is actively promoting the reinforcement of its facilities against earthquakes in accordance with its "Seismic Retrofitting Promotion Policy." However, it will take time to complete the seismic retrofitting of university facilities, and an earthquake could occur at any moment while work is still underway. In the meantime, sufficient consideration is therefore needed to protect people until buildings with poor seismic performance are retrofitted.



## Ensuring Safety Until Buildings with Poor Seismic Performance are Retrofitted

[Outline]



"Study Group on Earthquake Disaster Mitigation Focused on Seismic Reinforcement"

(Chief Investigator: Yoshiaki Kawata, Director, Disaster Prevention Research Institute)

(Administrative Sections: Facilities Planning Division, Facilities/Environment Department)

October 2006

Kyoto University

# Saving lives!

## Subduction-Zone Earthquake

In the event of a distant large-scale earthquake such as the Tonankai and Nankai earthquakes, strong horizontal tremors will occur in Kyoto approximately 20 seconds or more after the preliminary vertical tremors are felt. These strong horizontal tremors are likely to last for an extended period (1 minute or longer). Even though the ground will be shaking, it will be possible to move to an extent, and action can be taken to avoid danger.

### Buildings that meet seismic performance requirements

Although there will likely be no damage initially, furniture and other objects inside buildings that have not been secured may topple over or fall down.

### Buildings that do not meet seismic performance requirements

Considerable damage to these buildings is predicted.

## Inland earthquakes

Although sudden and violent vertical and horizontal tremors will occur similar to the Great Hanshin-Awaji Earthquake, these are only expected to last for about 10 seconds. During this time, however, it will be impossible to move.

### Buildings that meet seismic performance requirements

Although there is little danger of buildings collapsing, considerable damage is predicted.

### Buildings that do not meet seismic performance requirements

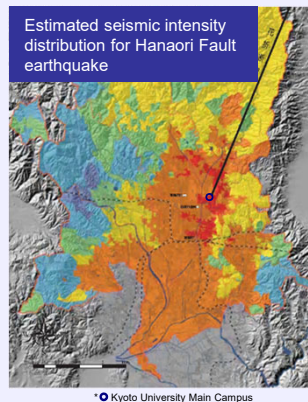
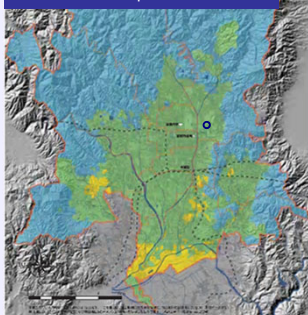
There is a high risk of buildings collapsing.

Irrespective of the seismic performance of the building itself, the measures in place to secure furniture and other items inside may still not be enough to withstand the force of the tremors. Furthermore, it will be impossible for people to move freely. Consequently, it is imperative that people take cover under tables, etc., the moment they feel a tremor.

As shown here, the majority of Kyoto University facilities are at high risk of experiencing strong tremors from earthquakes in the near future. Consequently, in addition to proceeding with the seismic retrofitting of facilities, efforts must also be made to ensure the safety of people using facilities that are yet to be retrofitted in the event of an earthquake. Furthermore, even if the seismic resistance of a facility is up to standard, we still need to devise ways to prevent any damage indoors from earthquake tremors.

Further details can be found in "Protecting Safety Until Buildings with a Poor Seismic Performance are Retrofitted" on the Kyoto University website.

## Estimated seismic intensity distribution for Nankai and Tonankai earthquakes



### Key: Seismic Intensity Table

Seismic Intensity	Impression of people experiencing the earthquake
7	At the mercy of the earthquake and unable to move freely.
Strong 6	Unable to stand or move without crawling.
Weak 6	Difficult to remain standing.
Strong 5	Many people are extremely frightened and feel that their ability to act is impeded.
Weak 5	Many people try to protect themselves. Some people feel that their ability to act is impeded.
4	Many people are scared and some try to protect themselves. Most people sleeping are woken up.
3	Most people indoors feel the tremor. Some people are afraid.
2	Many people indoors feel the tremor. Some people sleeping are woken up.
1	Some people indoors feel a slight tremor.

\*Adapted from the "Kyoto City Department Disaster Prevention Map" issued by the Kyoto City Fire Department Disaster Prevention and Crisis Management Office

## Preventative Measures

Thinking about the dangers caused by earthquake damage to buildings

### 1. Danger of collapsing buildings



\*From the Kyoto University Uji Campus Earthquake Safety Manual

### 2. Danger of moving or falling objects inside buildings



### 3. Danger of suspended objects falling from ceilings inside buildings



\*From the Education Facilities Research Center's "Case Studies of Seismic Nonstructural Retrofitting in School Facilities"

### 4. Danger of broken glass



These are some of the main dangers that are anticipated in an earthquake. For instance, even if a building meets seismic performance requirements, the damage caused by violent tremors described in 2 through 4 may be unavoidable. Preventative measures for which the characteristics of the university's educational and experimentation facilities are considered must be implemented regularly according to the circumstances of respective departments.

## Measures for dangerous, heavy, and valuable goods

Secondary disasters resulting from dangerous and heavy goods can not only cause injury and put lives at risk but greatly hinder the university's ability to continue with its educational and research activities as well as the maintenance of its educational, medical, and research facilities. Measures to prevent or mitigate disasters are therefore continuously required.

Example) In 1977, a chemical laboratory at Columbia University in New York burned down after a substance that ignites at normal temperatures ignited after it was left in a refrigerator during a major power outage that lasted three days.

### Storage of dangerous goods

### Arrangement of heavy objects, installations, equipment, etc.

### Other special articles to be stored (valuable goods, books, materials, etc.)

## Raise awareness of the damage that can be caused by toppled furniture, etc.

The risk of furniture or items falling over significantly increases if the seismic intensity of an earthquake is 5 or stronger, regardless of the strength of seismic resistance. Even if a building has had seismic retrofitting work performed, efforts must still be made to prevent furniture and other items from falling over.

## Basic knowledge for preventing furniture from falling over

Movement patterns of furniture during earthquakes

Example of wires fitted to bookshelves

\*Adapted From Aichi Prefectural Government website

Predicted location of fallen bookshelves and equipment based on the room arrangement

Earthquake-resistant pads

(Available at CO-OP shops, stationery stores, hardware stores, etc.)

## Specific measures to prevent furniture from falling over

Because preventative measures are determined by the use of the room, the type of building structure, and differences in the interior finish, it is necessary to implement measures appropriate for each type of facility.

## Evacuation Measures



### Evacuation Sites

Kyoto University has secured and designated safe outdoor locations as temporary evacuation sites to protect students, patients, faculty, and staff in the event of an emergency. Be sure to check the location of these sites.



### Evacuation routes inside buildings

Please confirm that there are at least two separate evacuation routes out of the building. Ensure that information regarding evacuation routes and the locations of fire extinguishers and fire hydrants are displayed near the entrances to rooms that are used by many people. Make sure that these details are regularly confirmed during safety drills, etc.



### Secure indoor evacuation routes

Safe passageways inside laboratories and other facilities. Please secure safe passageways (evacuation routes), paying particular attention to storage spaces for ignitable agents and the positioning of flammable materials.

Arrangement of furniture and equipment in laboratories and experimentation rooms

While it is important to put in place measures to secure furniture and equipment in the event of an earthquake, please also give consideration to the arrangement of items to ensure that safe passageways (evacuation routes) are not blocked if they fall over.



### Deciding when necessary to evacuate

Buildings meeting current seismic standards or reinforced against earthquakes

As the risk of collapse or major damage is low even from the shock and impact of an earthquake occurring locally, do not rush outside of the building.

Buildings that do not meet seismic performance requirements. Because there could be significant damage to the building, the persons inside may be unable to evacuate by themselves.



### Measures according to the use of rooms (buildings)

Keep track of information such as the location of students, patients, faculty, and staff.

Because persons working alone on experiments or other activities are at risk of being unable to evacuate depending on the disaster situation, ensure that information on the whereabouts of people is shared in advance.



### Measures according to the seismic resistance of buildings

Seismic-resistant facilities

Do not rush out of the building and act according to each facility's emergency response guidelines/manuals.

Facilities lacking seismic resistance

Walk to the exit of the building without using the elevators and evacuate to a safe location if it is safe to do so.



### Fire

The general rule is not to extinguish a fire immediately after an earthquake but to put it out only once the tremors have subsided. Put out fires that have just broken out if the flames are still at roughly waist height using a fire extinguisher. If this is not possible, please call 119 and evacuate outside immediately.



### Safety confirmation

Gather information on the safety of students, patients, faculty, and staff, and after the earthquake has subsided, inform the relevant persons that you are also safe.