

Architects' Role in Disasters

ARCASIA Committee on Social Responsibilities (ACSR) Half day symposium
Kathmandu 10 October 2013

The Japan Institute of Architects

JIA



20years after disaster

OKUSHIRI ISLAND



Oct. 1993 affected by tsunami



Tsunami protection sea wall



Emergency evacuation facility at sea side



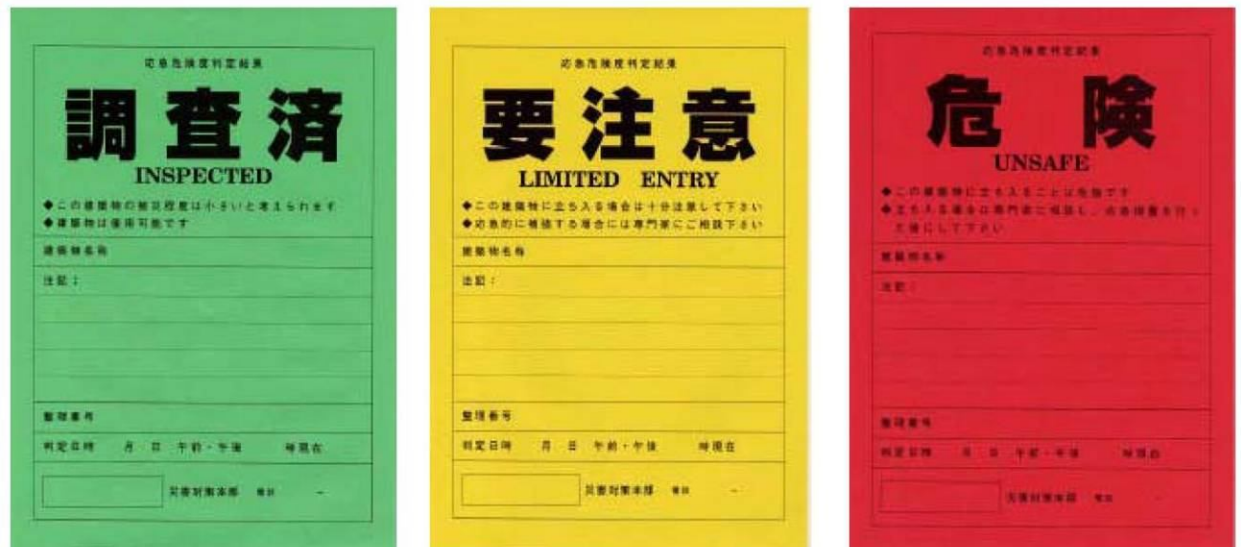
Sep.2013 Okushiri island

JIA Disaster Relief Activities

JIA's activities procedures are decided in major disasters, in the case of more than 6-seismic intensity earthquakes occurrence in Japan.

- Building Damage and Safety Assessments
 - 1 Quick inspection.
 2. Damage assessments.
 3. Consultation for victims and detailed assessments for recovery.

Post-evaluation placards



JIA Disaster Relief Activities

Volunteer Rapid Damage Assessments:

1995 South Hyogo earthquake(7)

2000 Tottori west earthquake(6+)

2001 Geiyo earthquake(6+)

2003 North miyagi earthquake(6+)

2003 Tokachi earthequake(6-)

2004 Niigata earthquake(7)

2005 Fukuoka earthquake(6-)

2007 Noto earthquake(6+)

2008 IwateMiyagi earthquakle(6+)

2009 Surugawan earthquake(6-)

2011 East Japan earthquake(7)



Niigata 2004



Zenn temple SOJJI , Noto earthquake2007

Seismic Intensity Scale

(Japan Meteorological Agency)

Summary of Tables explaining the JMA Seismic Intensity Scale

0 Imperceptible to people.

1 Felt slightly by some people feeling quiet in buildings.

2 Felt by many people feeling quiet in buildings.

3 Felt by most people in buildings.

4

- Most people are startled.
- Hanging objects such as lamps swing significantly.
- Unstable ornaments may fall.

5 Lower

- Many people are frightened and feel the need to hold onto something stable.
- Dishes in cupboards and items on bookshelves may fall.
- Unsecured furniture may move, and unstable furniture may topple over.

5 Upper

- Many people find it difficult to walk without holding onto something stable.
- Dishes in cupboards and items on bookshelves are more likely to fall.
- Unsecured furniture may topple over.
- Unreinforced concrete-block walls may collapse.

6 Lower

- It is difficult to remain standing.
- Many unsecured furniture moves and may topple over. Doors may become wedged shut.
- Wall tiles and windows may sustain damage and fall.
- In wooden houses with low earthquake resistance, tiles may fall and buildings may lean or collapse.

6 Upper

- It is impossible to move without crawling. People may be thrown through the air.
- Most unsecured furniture moves, and is more likely to topple over.
- Wooden houses with low earthquake resistance are more likely to lean or collapse.
- Large cracks may form, and large landslides and mass collapse may be seen.

7

- Wooden houses with low earthquake resistance are even more likely to lean or collapse.
- Wooden houses with high earthquake resistance may lean in some cases.
- Reinforced-concrete buildings with low earthquake resistance are more likely to collapse.

If you feel a tremor

- Protect your head and shelter under a table
- Don't rush outside
- Don't worry about turning off the gas in the kitchen
- Panic leads to injury

Remain calm, and secure your personal safety

- When driving a car, turn on your hazard lights, then slow down smoothly
- Keep away from gates, walls, vending machines and buildings
- Leave immediately to highland when a strong shake has been felt on the seashore

If you see/hear an Earthquake Early Warning

Make residences earthquake-resistant and fix furniture to prepare for earthquakes

Ministry of Land, Infrastructure, Transport and Tourism
Japan Meteorological Agency

Address: 1-3-4 Otsuchi Chōme-ku, Tokyo 100-8122
Phone: 03-3212-6341
Website: <http://www.jma.go.jp/>

6 Lower (JIA Emergency)

Human perception and reaction:

It is difficult to remain standing.

Indoor situation:

Many unsecured furniture moves and may topple over. Doors may become wedged shut.

Outdoor situation:

Wall tiles and windows may sustain damage and fall.

7 (The Great East Japan Earthquake M9.0)

Human perception and reaction:

It is impossible to remain standing or move without crawling. People may be thrown through the air.

Indoor situation:

Most unsecured furniture moves and topples over, or may even be thrown through the air.

Outdoor situation:

Wall tiles and windows are even more likely to break and fall. Reinforced concrete-block walls may collapse.

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Great East Japan earthquake 2011



Disaster countermeasures office



Tsunami affected area

Great East Japan earthquake 2011



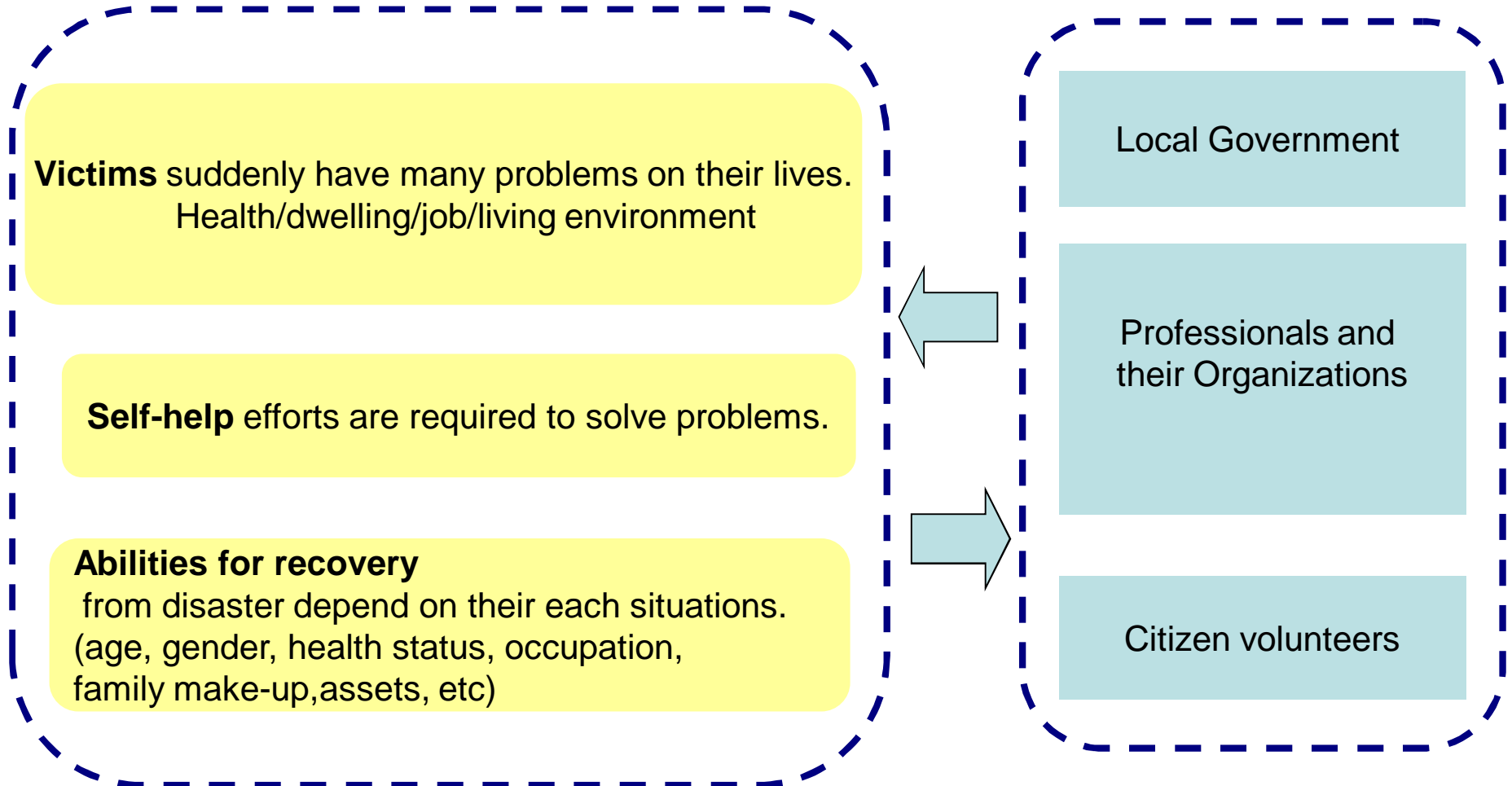
Estimate damage with public service personnel



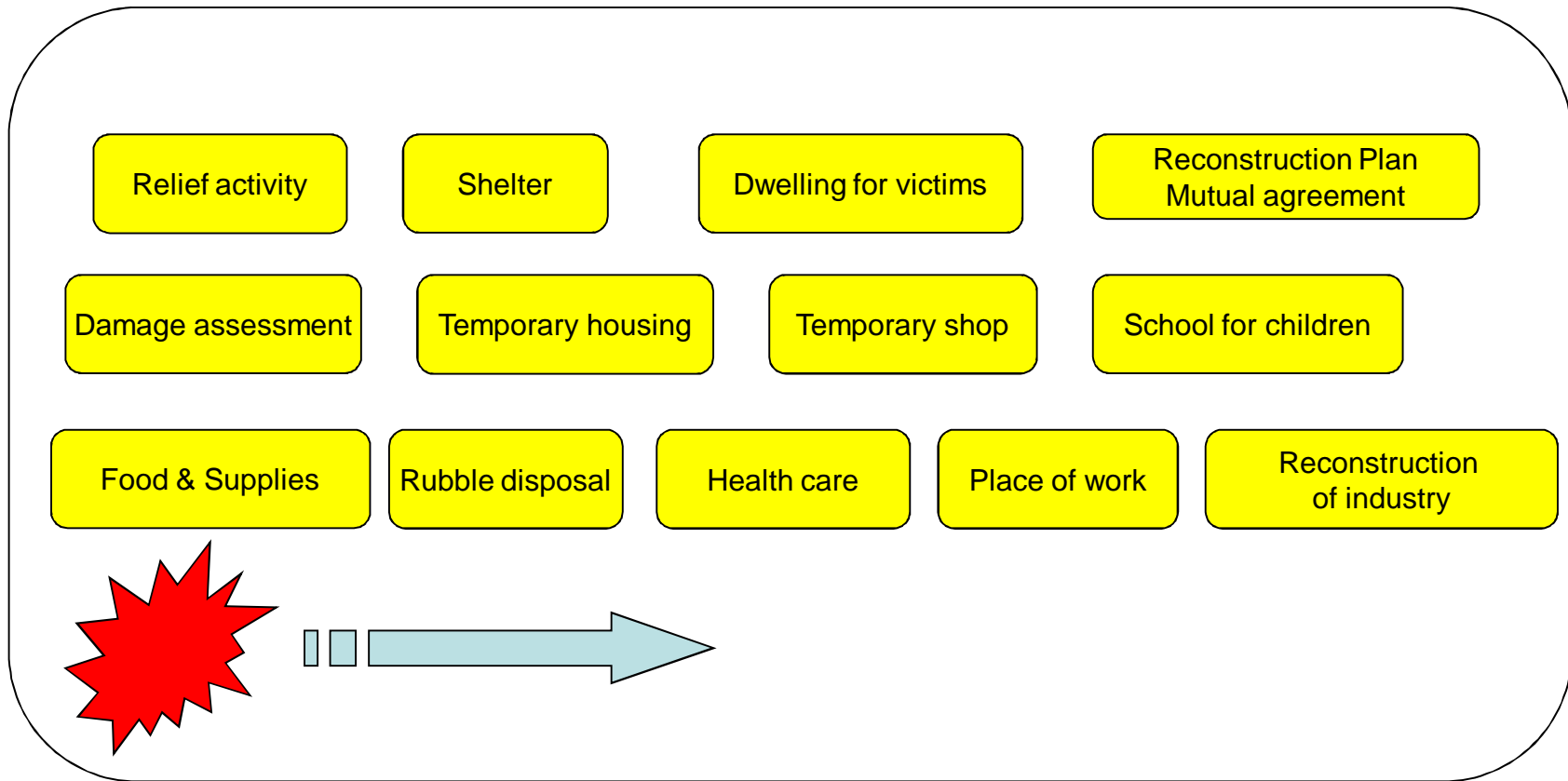
Record on the map



Support activities for victims



Support Activities by Government



Comprehensive Role of Architects

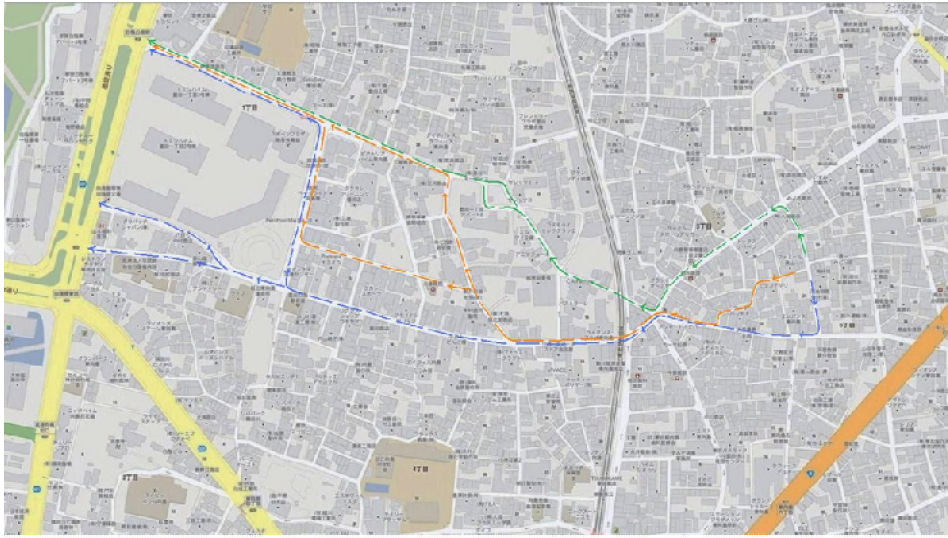
- Recovery
 - Recovery design assistance
 - Repair/Rebuilding recommendations



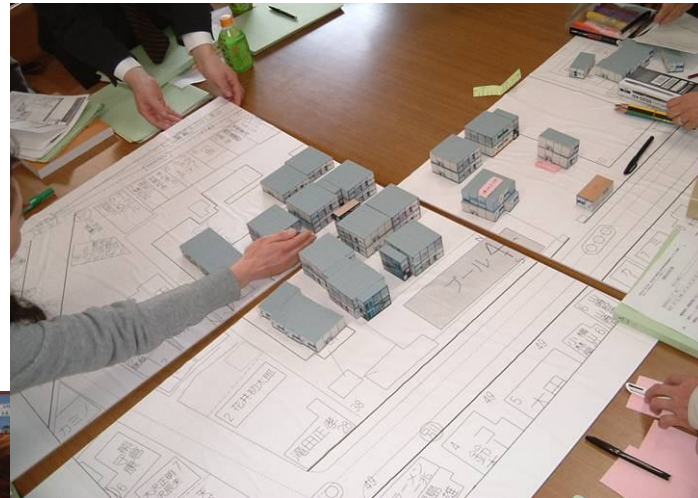
- Prevention
 - Building Risk Assessment
 - Hazard Mitigation
 - Recommendations for best practices



Prevention



Evacuation route in the event of earthquake



Desaster drill

Prevention



Architectural education



Existing Building Seismic Retrofits

Architects' role as professional

What is professional?

- For whom? For what?
- Do professionals obtain sufficient social credibility?
- Why are some buildings and cities vulnerable?



Strategic use of professionals

1. Propose / Design:
 - the comprehensive reconstruction plan.
 - temporary housing, dwellings for victims.
2. Consultation for victims, including repair/ rebuilding recommendations.
3. Rapid damage assessment .

In the event of natural disasters,
architects will be able to contribute to the society
using their talents and skills.

What can Architects do for natural disasters' risk reduction, for possible earthquakes, JIA?

What can Architects do for natural disasters' risk reduction, for possible earthquakes, JIA?

Anybody should be secured from possible earthquakes.

- An effect of each earthquake to buildings.
- Not only structures, but every fixture also hurt us fatally.
- Three phases of the structural guideline and structural behavior.
- Apart from structures, nonstructural materials to be earthquake resistant.
- Examples of earthquake destructions.
- Attempts to enforce older buildings.

A torrential heavy rain, resulting in over-flood in Kyoto, autumns 2013



A torrential heavy rain, resulting in over-flood in Kyoto, autumns 2013



A tornados attack several times, to many places in Japan, this autumns.



A tornados attack several times, in many places in Japan



JIA

A building height and a seismic intensity, The higher, then more effected by an earthquake.

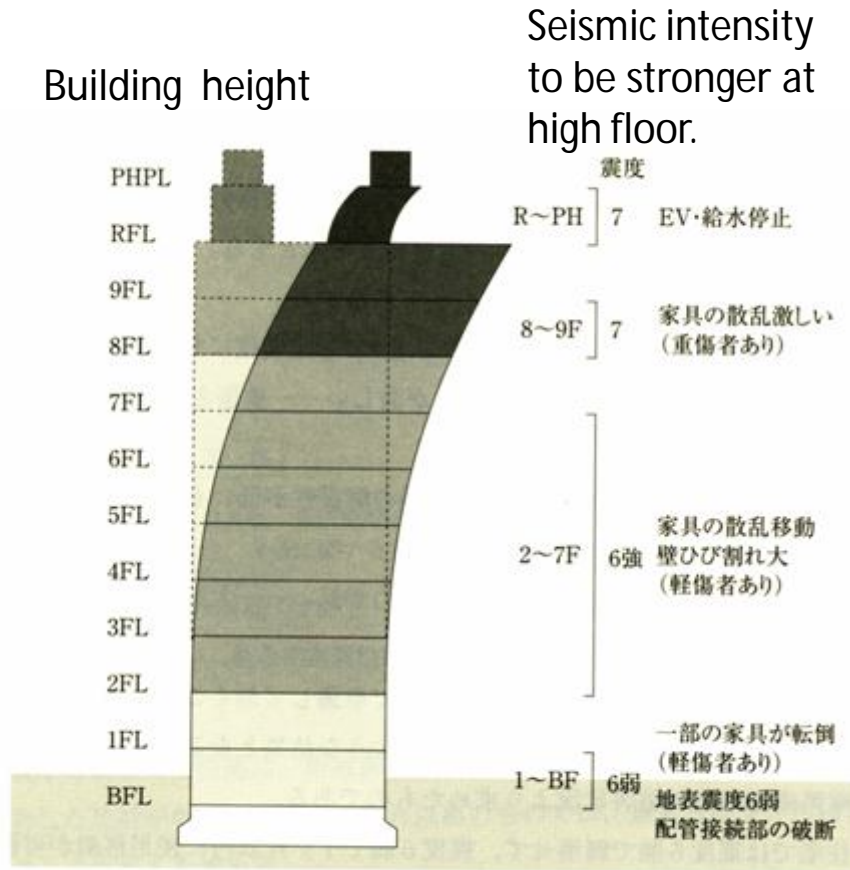


図-1.5 高さとも揺れの大きさ⁷⁾

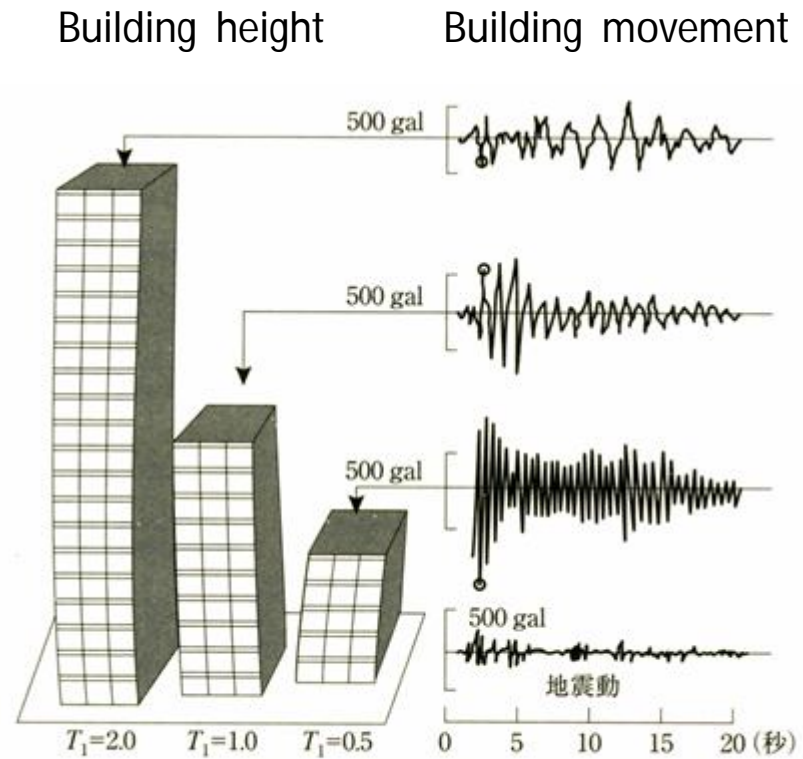
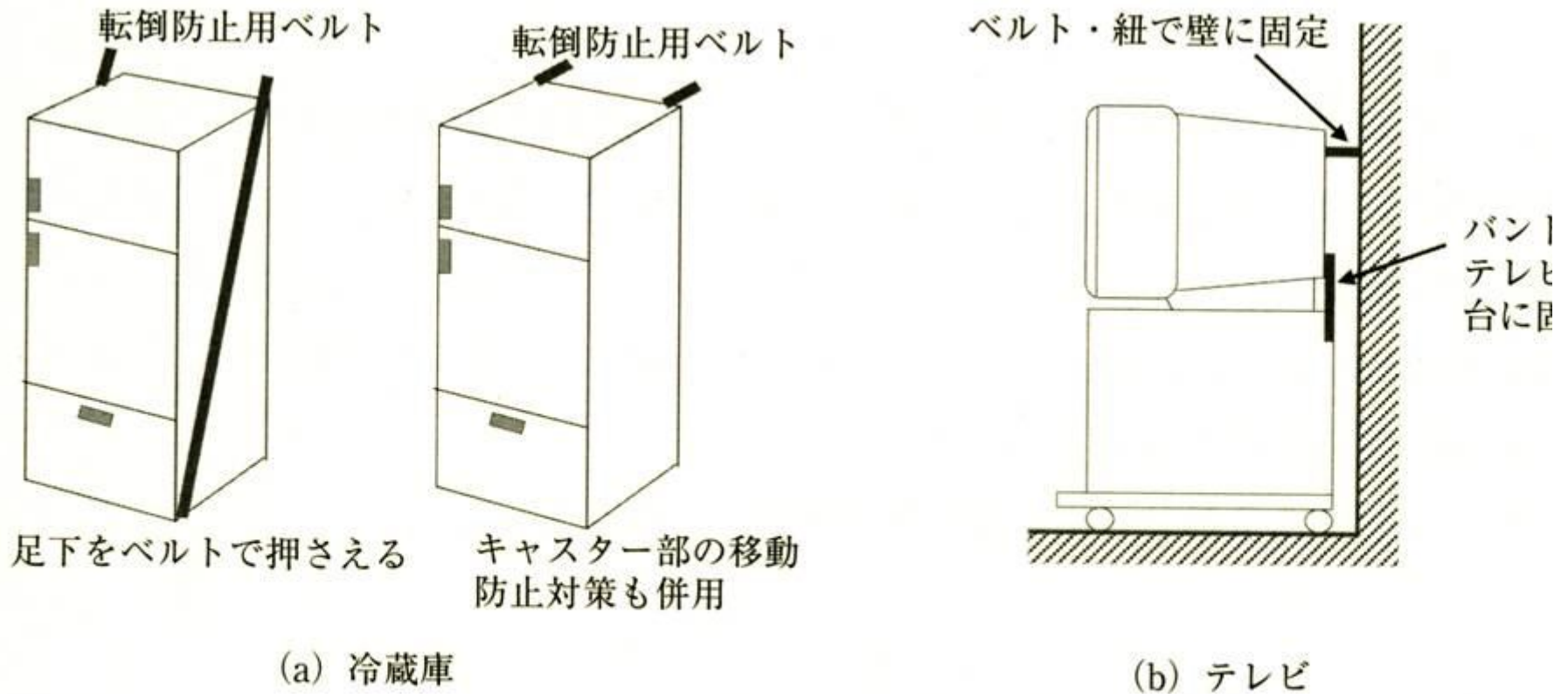


図-4.6 建物の固有周期(T_1)と地震応答⁴⁾

The higher, then slower movement

Any fixture should be fixed at higher floors not to fall down



A refrigerator

図-8.11 家電機器の固定例 A TV set

The deference of an earthquake persistency by its building year

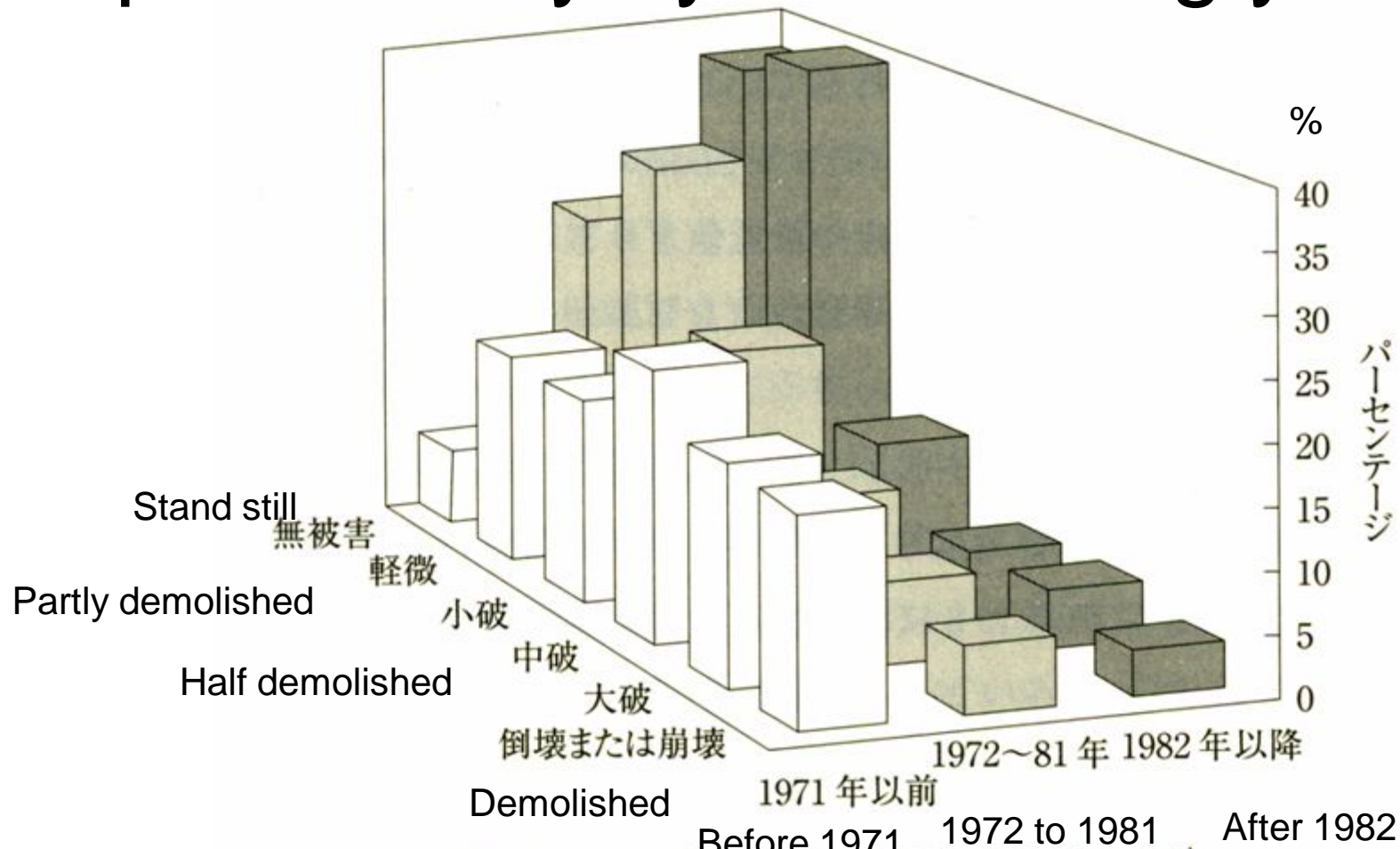
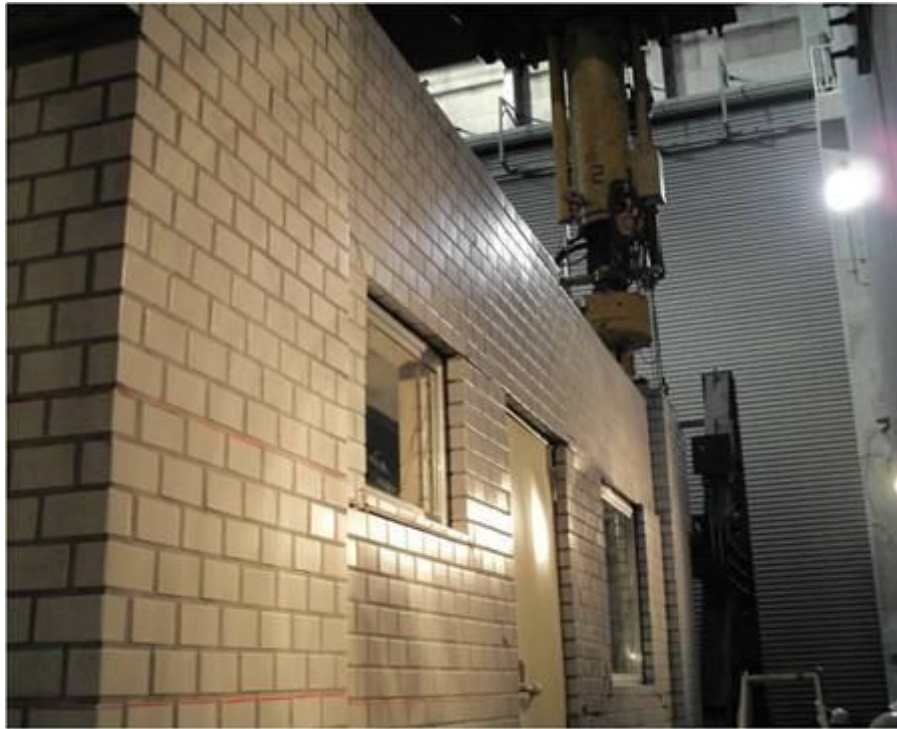
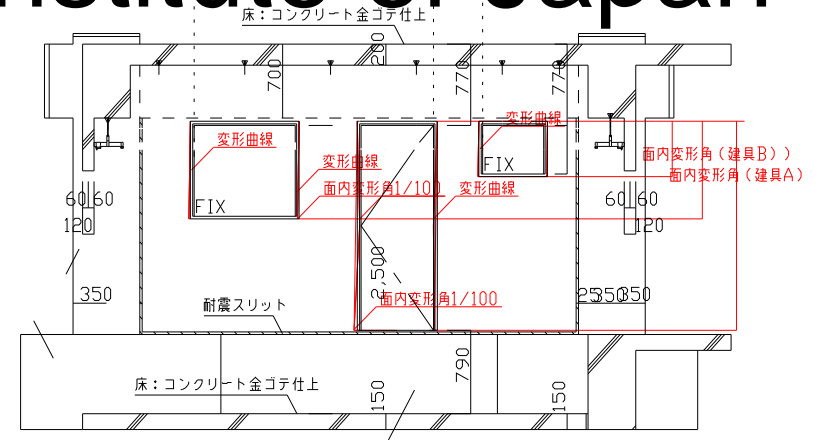


図-4.1 RC造建築物の建設年代と被害率¹⁾

An experiment in destructions, Building Research Institute of Japan



The real sized reinforced concrete building to be deformed.



A window and a door during the experiment



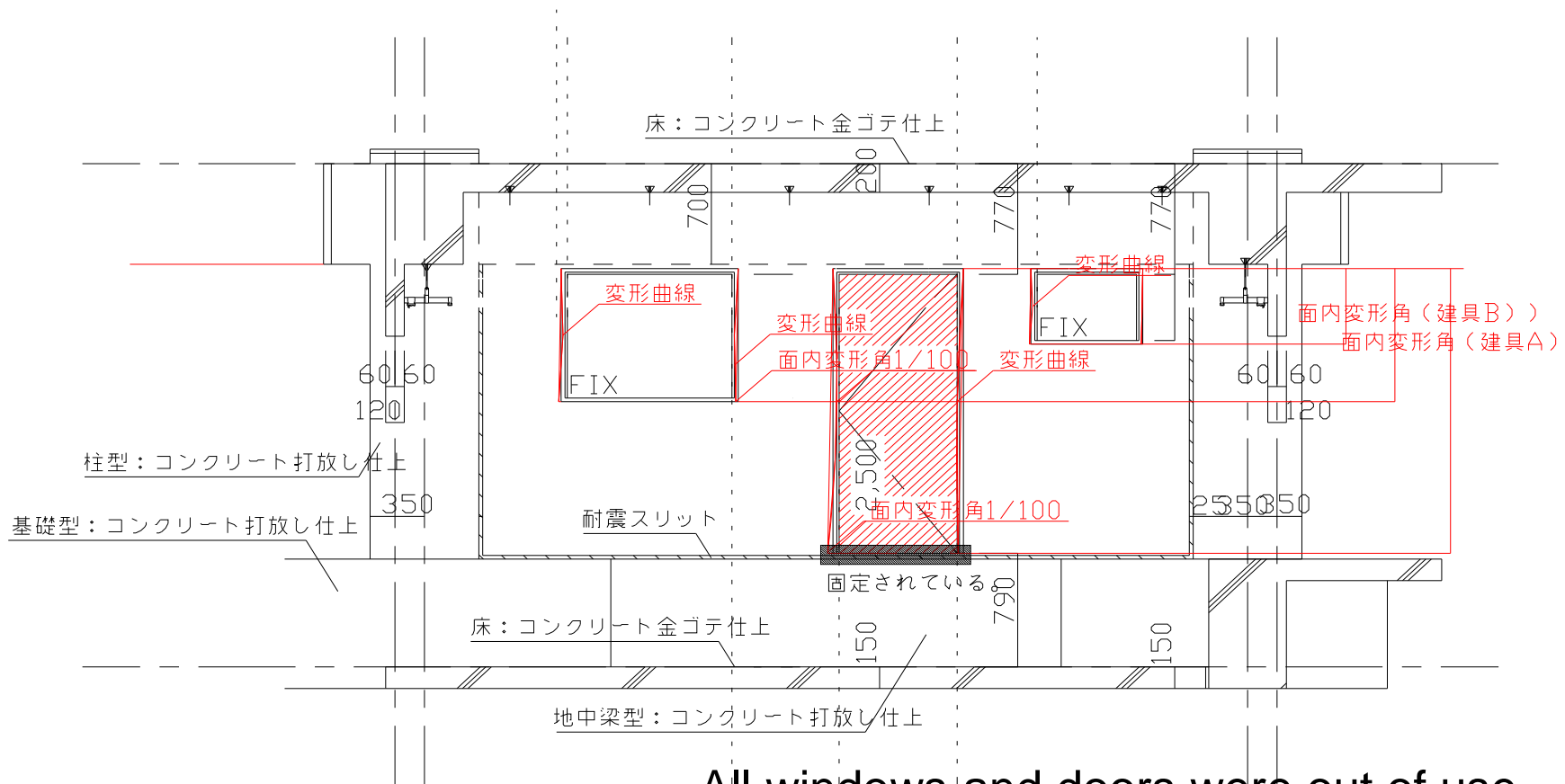
At one stage of deformation, windows and doors were completely damaged 25

A surface of a concrete wall were damaged at final stage of this experiment of demolishing



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How fixtures were broken by this deformation experiment.



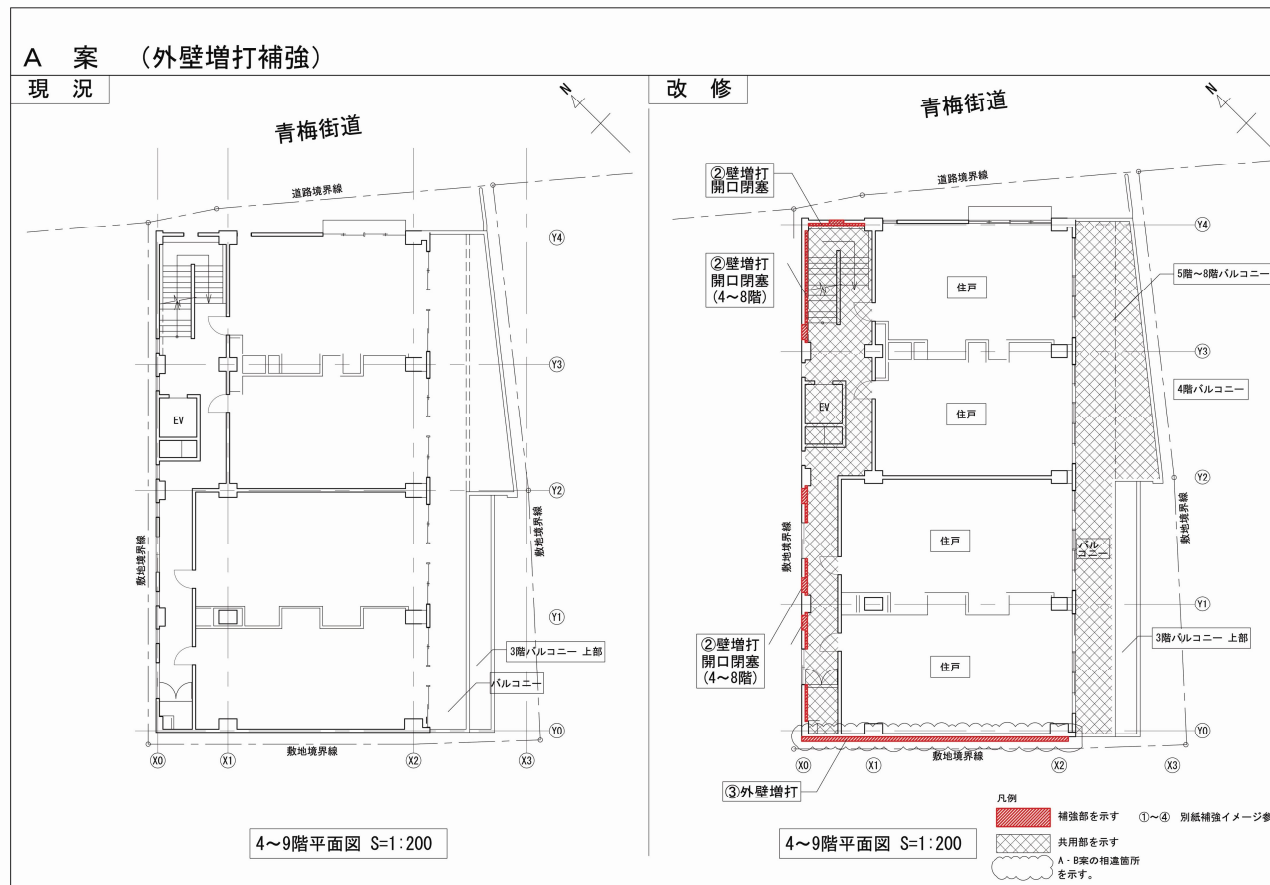
All windows and doors were out of use ,
then no one can evacuate out of the room.

One of the proposal for a safer panic door, a dual door system.



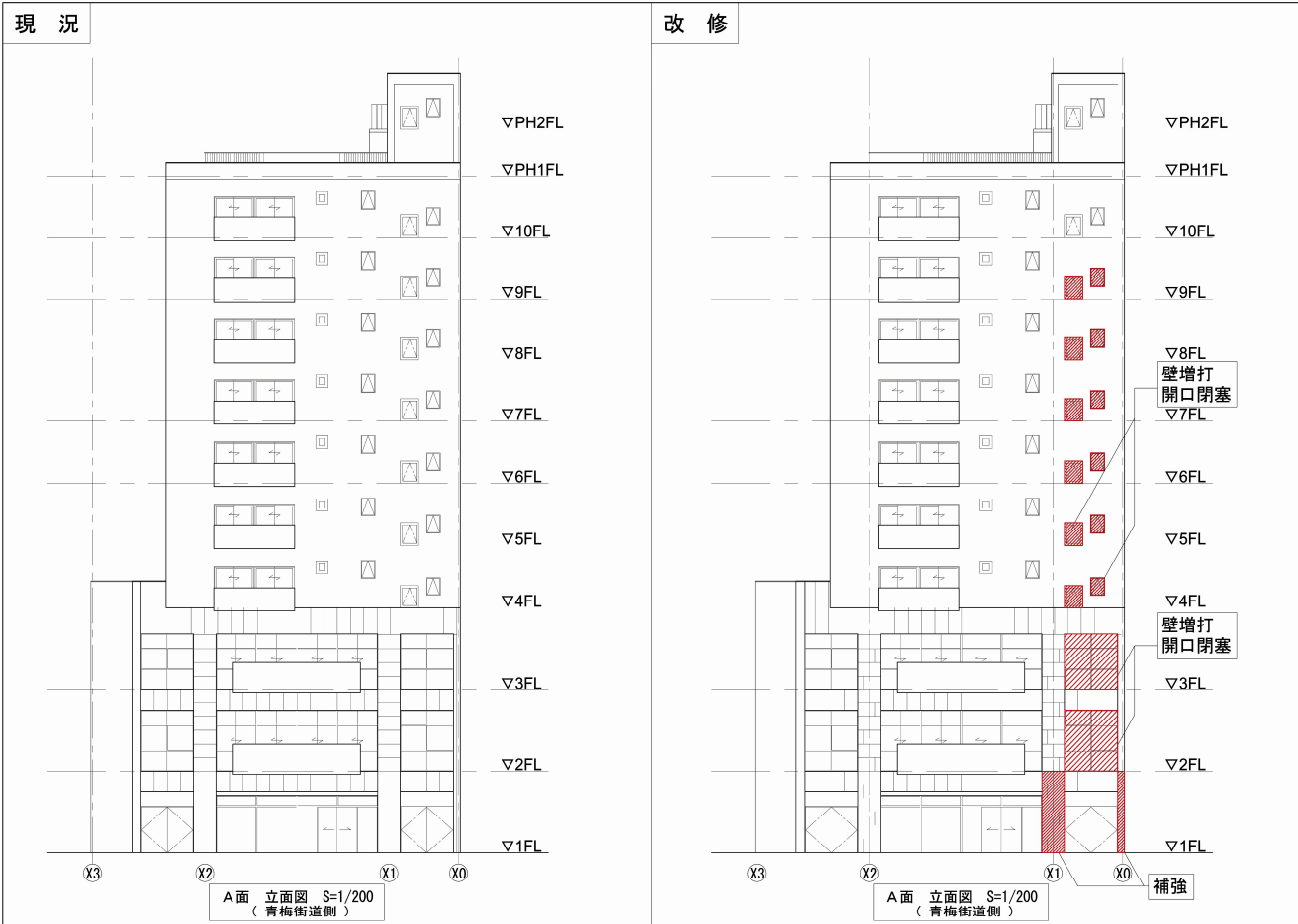
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An example of an enforcement to be resistant to an future earthquake, for a condominium.



Stuffing a openings with a concrete to be more resistant.

An example of an enforcement to be resistant to an future earthquake, for a condominium.



Adding a concrete wall to be more resistant.

An example of an enforcement to be resistant to an future earthquake, for toll gates of Highway.



An example of an enforcement to be resistant to an future earthquake, for toll gates of Highway.



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