

# Earthquakes in Matsubushi Town

Since earthquakes occur suddenly, it is important to raise awareness of disaster prevention on a daily basis. Understand earthquakes correctly, use earthquake hazard maps, and prepare so that you can act without panic in an emergency.

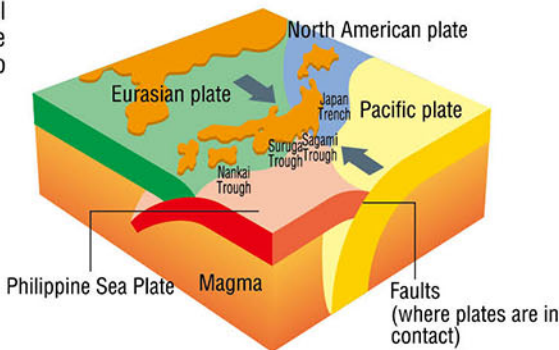
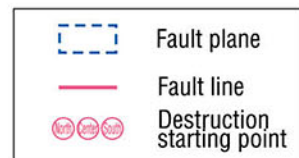
## Estimated Damage to Matsubushi Town

According to the "Saitama Prefecture Earthquake Damage Estimation Survey" conducted by Saitama Prefecture in 2012 and 2013, the earthquake expected to cause the greatest damage to Matsubushi Town was the "Southern Ibaraki Earthquake (see below)." Based on this assumption, the maximum seismic intensity in Matsubushi Town is 6 upper, and the following damage is predicted.

● Fatalities	4 people (5am in winter, wind speed 8m/s)	● Power outage damage prediction (immediately after earthquake, no fire)	7,877 households
● Injured	65 people (5am in winter, wind speed 8m/s)	● Prediction of line damage caused by subscriber line interruptions (*)	44 lines, outage rate 0.34%
● Liquefaction potential (area ratio)	Somewhat high 27.8%/High 47.3%	● Mobile phone outage rank prediction (*)	Power outage rate 11.7%, interruption rate 0.3%
● Number of completely destroyed buildings (shaking + liquefaction)	259 buildings	● City gas damage prediction	1,970 cases of supply stoppage (supply stoppage rate 100%)
● Number of partially collapsed buildings (shaking + liquefaction)	754 buildings	● Water supply interruption prediction (1 day later)	2,822 households
● Number of buildings burned down	29 buildings (*) *Winter 6:00 p.m./ Wind speed 8m/s	● Disturbance of sewer pipe function	6,628 people

## Assumed Earthquake

Around the Japanese archipelago, there are four plates (plate-shaped hard crust) as shown in the right figure, which are moving in a certain direction at a speed of several centimeters per year. Earthquakes are caused by the "strain" that occurs at the plate boundary and its surroundings due to the movement of the plates. There are mainly two types of earthquakes in Japan: ocean trench earthquakes and active fault earthquakes.



In the Saitama Prefecture Earthquake Damage Estimation Survey, three subduction-zone earthquakes and two active fault-type earthquakes were used as hypothetical earthquakes, and items related to earthquakes, as well as various disasters, damages, and impacts, were predicted. For active fault-type earthquakes, multiple patterns are set because the seismic intensity distribution varies greatly depending on the setting of the rupture start position due to the earthquake.

## Trench earthquake

When the oceanic plate subducts, the continental plate is dragged in, strain builds up at the boundary, and when it reaches its limit, it bounces back and causes an earthquake.

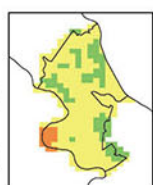
"2003 Tokachi-Oki Earthquake" (Magnitude 8.0), "1994 Hokkaido-Toho-Oki Earthquake" (Magnitude 8.2), "2011 Tohoku-Pacific Ocean Earthquake (Great East Japan Earthquake)" (Magnitude 9.0, the largest recorded in Japan) ) Such



## Three assumed subduction-zone earthquakes

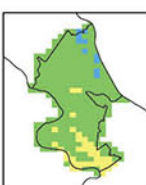
### Southern Ibaraki Earthquake

- Magnitude 7.3
- Maximum seismic intensity in Matsubushi Town: 6 upper
- Reflecting the latest knowledge on hypocenter depth of the Philippine Sea plate
- Probability of an M7-class earthquake occurring in the Southern Kanto region within the next 30 years: 70%



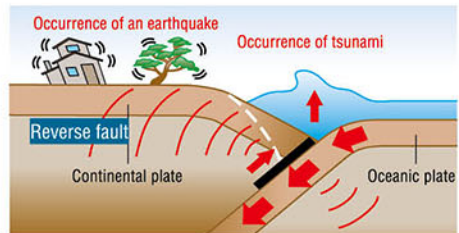
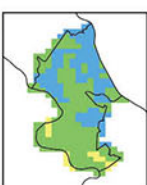
### Northern Tokyo Bay Earthquake

- Magnitude 7.3
- Maximum seismic intensity in Matsubushi Town: 6 lower
- Reflecting the latest knowledge on hypocenter depth of the Philippine Sea plate
- Probability of an M7-class earthquake occurring in the Southern Kanto region within the next 30 years: 70%



### Genroku-type Kanto earthquake

- Magnitude 8.2
- Maximum seismic intensity in Matsubushi Town: 6 lower
- Assuming the Genroku Earthquake (Great Kanto Earthquake), which is said to have caused great damage in the Tokyo metropolitan area
- Probability of an earthquake occurring within the next 30 years: Nearly 0%

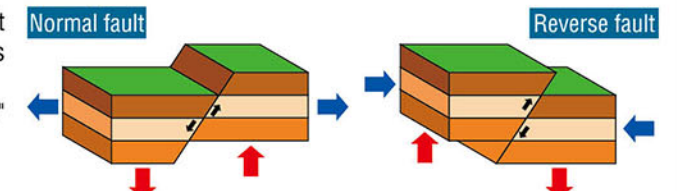


## Active fault earthquake

The crust of the land is also "distorted" everywhere due to the movement of the plate. In order to eliminate this strain, earthquakes occur with faults (active faults) caused by past earthquakes as epicenters.

"1995 Hyogoken Nanbu Earthquake (Great Hanshin-Awaji Earthquake)" (Magnitude 7.3)

"2004 Niigata Prefecture Chuetsu Earthquake" (Magnitude 6.8) etc.



## Two assumed active fault earthquakes

### Kanto Plain Northwest Margin Fault Zone Earthquake

- Magnitude 8.1
- Maximum seismic intensity in Matsubushi Town: North 6 lower, Center 5 upper, South 5 upper
- Fukaya fault and Ayasegawa fault are assumed as a single fault zone
- Probability of an earthquake occurring within the next 30 years: 0.008% or less



### Tachikawa fault zone earthquake

- Magnitude 7.4
- Maximum seismic intensity in Matsubushi Town: North 5 lower, South 5 lower
- Verification based on hypocenter conditions based on the latest knowledge
- Probability of an earthquake occurring within the next 30 years: 2% or less



## Magnitude and Seismic Intensity

The relationship between magnitude and seismic intensity can be likened to the relationship between the brightness of a light bulb and the brightness above a desk.



Just as the light from the same light bulb can affect the brightness of a desk depending on where it is placed, an earthquake with the same magnitude will have a smaller seismic intensity if the epicenter is farther away, and a larger seismic intensity if the epicenter is closer.

## What is Magnitude

Magnitude (hereinafter referred to as M) is a unit that indicates the scale of an earthquake. The Great Kanto Earthquake was M7.9, the Great Hanshin-Awaji Earthquake was M7.3, and the Great East Japan Earthquake was M9.0 (the largest recorded in Japan). If M increases by 0.2, the energy scale of the earthquake doubles, and if M increases by 1, it increases about 32 times.

## What is seismic intensity

Seismic intensity indicates the magnitude of shaking at each point during an earthquake. How a certain point actually shakes depends not only on the magnitude of the energy of the earthquake, but also on the distance from the epicenter to the point and ground conditions.

## What is the damage caused by a seismic intensity of 6 upper?

The damage caused by the "Southern Ibaraki Earthquake" in Matsubushi Town with a maximum seismic intensity of 6 upper is assumed as follows.

## Seismic intensity 6 upper

- I can't move without crawling. You may be blown away.
- Most of the unfixed furniture will move and a lot of it will fall over.
- Wooden buildings with low earthquake resistance tend to lean or collapse.
- Large cracks may occur, and large-scale landslides and mountain collapses may occur.



## How to Use the Earthquake Hazard Map

An earthquake hazard map is a map designed to minimize damage. By obtaining information on earthquake disasters and knowledge of evacuation methods, the awareness of disaster prevention will increase on a daily basis, and evacuation behavior will be carried out smoothly in the event of a disaster.

The earthquake hazard map for Matsubushi Town was created based on the results of the Saitama Prefecture Earthquake Damage Estimation Survey conducted by Saitama Prefecture.

The "Saitama Prefecture Earthquake Damage Estimation Survey" is based on the latest scientific knowledge related to an earthquake directly below the Tokyo metropolitan area and past destructive earthquakes in Saitama Prefecture.

## 1 Be informed about earthquakes

Be informed about the earthquake assumed in Matsubushi Town. Gaining knowledge about the epicenter and damage will change your awareness of disasters.

## 2 Consider how to evacuate

Check your home and evacuation center on the hazard map and consider evacuation routes. Also, walk around and check if there are any dangerous spots.

## 3 Prepare for an earthquake

You can minimize damage by not only preparing supplies such as stockpiles, but also by confirming in advance how to reinforce the earthquake resistance of your house and how to contact your family.



Earthquakes occur suddenly without warning. Protect your own life first and act without panic. If you are safe, you can evacuate safely and help people around you.

## Take Action to Save Lives

**Earthquake!**

“Safety actions①-②-③” to protect yourself from earthquake shaking



- ① Drop... Lower your posture and get closer to the ground before you fall down due to a strong tremor
- ② Cover your head... Get under a fixed desk or table (if not, protect your head with your arm or bag)
- ③ Hold on... Stay still and do not move until the shaking stops. Don't go out in a hurry

## In the Event of a Disaster in Your Home or Building

### If you feel a tremor

#### Protect yourself

- Lie down under a sturdy table or desk.
- Protect your head with a cushion or cushion.
- Wait for the shaking to stop.



#### Check fire source

- In case of small shaking, put out the fire immediately.
- After the shaking has stopped, extinguish all fires.
- When evacuating, turn off the main gas valve and turn off the electric breaker.



#### Secure an exit

- Secure an exit by opening doors and windows.
- It's a good idea to put something close at hand to prevent the door or window from closing again.



#### Act calmly

- Don't rush outside.
- Be careful of broken glass shards. Wear slippers or shoes indoors.



### When the shaking stops

#### Confirm the safety of your family

- Call to confirm safety.
- Confirm the safety of family members who are far away using a predetermined contact method (gathering at the meeting place, using the disaster emergency message dial, sending messages to relatives, etc.).



#### Confirm the safety of neighbors

- Call out to your neighbors to confirm their safety.
- Pay special attention to people with disabilities and the elderly.



#### Get the right information

- Obtain correct information from television, radio, disaster prevention administrative radio, etc.
- Be careful not to be misled by hoaxes.



#### Evacuate together

- Gather as many people as possible and evacuate.



## In the Event of a Disaster While Away from Home

### Road/Alley

- Stay away from block walls, vending machines, etc.
- Watch out for falling window glass, signboards, and wall tiles, and protect your head with a bag.



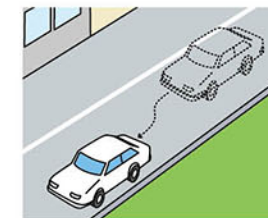
### Underground mall

- Relatively safe unless a fire breaks out.
- In the event of a power outage, do not move recklessly until the emergency lights are turned on.
- Follow the in-house announcements and the instructions of the staff, and go aboveground without rushing to a single emergency exit.



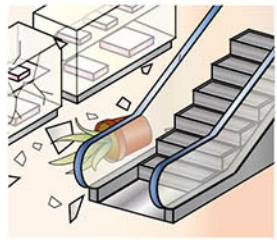
### Driving

- Slow down and stop on the left side of the road.
- Turn off the engine and stay in the car until the shaking stops.
- When evacuating, leave the car keys in the car and close the windows without locking the doors.



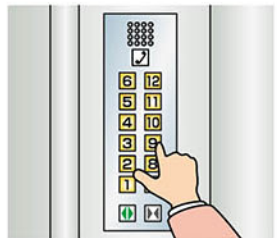
### Downtown/Large Buildings

- Move away from the product shelves and lean against the pillars and walls.
- The latest buildings and underground malls are highly earthquake-resistant, so you don't need to go out.
- At stores, follow the announcements and instructions of the staff.



### In the elevator

- Press the buttons for all floors and get off immediately at the floor where it stops.
- If you are trapped, press and hold the emergency button and call for help on the emergency phone.



### Train/Bus

- Be prepared for emergency stops and sudden braking.
- If you are sitting, stay low and protect your head. If you are standing, hold onto a handrail or strap.
- Follow the crew's instructions.



### If an earthquake occurs on the coast (preparing for a tsunami)

If an earthquake strikes while you are in an area close to the coast or the sea, such as when you are traveling, it is extremely important to be aware of tsunamis in addition to responding to tremors.

- If you feel a "strong tremor" or "weak but long tremor" or see or hear a "tsunami warning" or "tsunami advisory", move away from the coast immediately and evacuate to as high a place as possible.
- A tsunami occurs many times, and the waves that come later may be higher.
- Never go near the coast until the tsunami warning or tsunami advisory has been lifted and it is confirmed that it is safe.
- Make sure to check the location of the tsunami evacuation site, tsunami evacuation building, and route to high ground in advance.

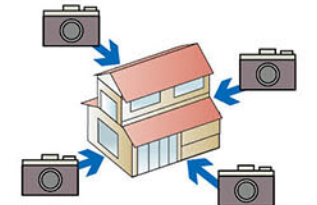
#### Tsunami sign



## Action after Earthquake

### Take pictures of the damage before cleaning up

In order to receive support for rebuilding your life in the future, let's leave a picture of the situation at the time of the damage. The photos taken will be useful for issuing a disaster victim certificate necessary for assistance and for claiming damage insurance from an insurance company. Shooting with a camera such as a smartphone is fine. Take as many detailed pictures as possible from different angles.



### Apply for a disaster certificate

Disaster Victim Certificates are issued by local governments to certify the degree of damage to houses that have been damaged by natural disasters such as earthquakes and storms and floods. This certificate is required when receiving various support measures for disaster victims, such as the payment of support funds for rebuilding the livelihoods of disaster victims and emergency repairs of houses.

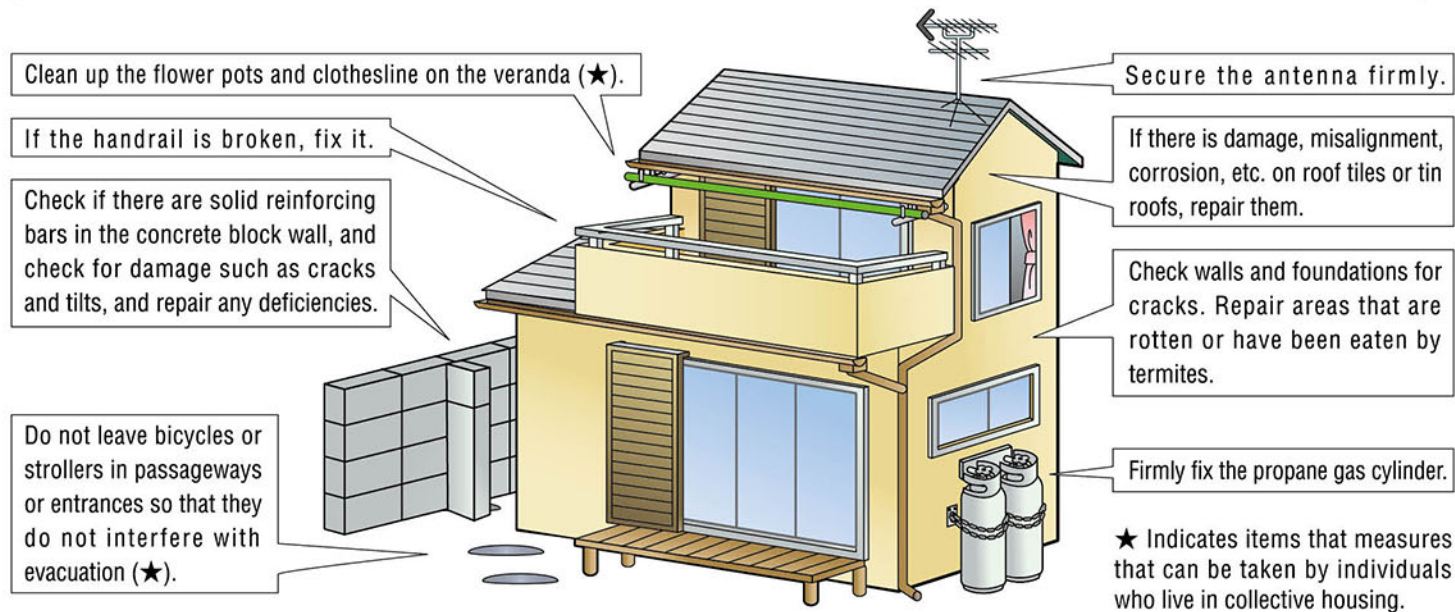
Victim certificates are not issued immediately. After the application, it takes time because it is necessary to certify the degree of damage in the "Damage Certification Investigation" conducted by the town staff. Please apply as soon as possible.





In order to protect yourself from an earthquake and to continue living at home after a disaster, make sure to perform regular inspections and repairs to ensure the safety of your home.

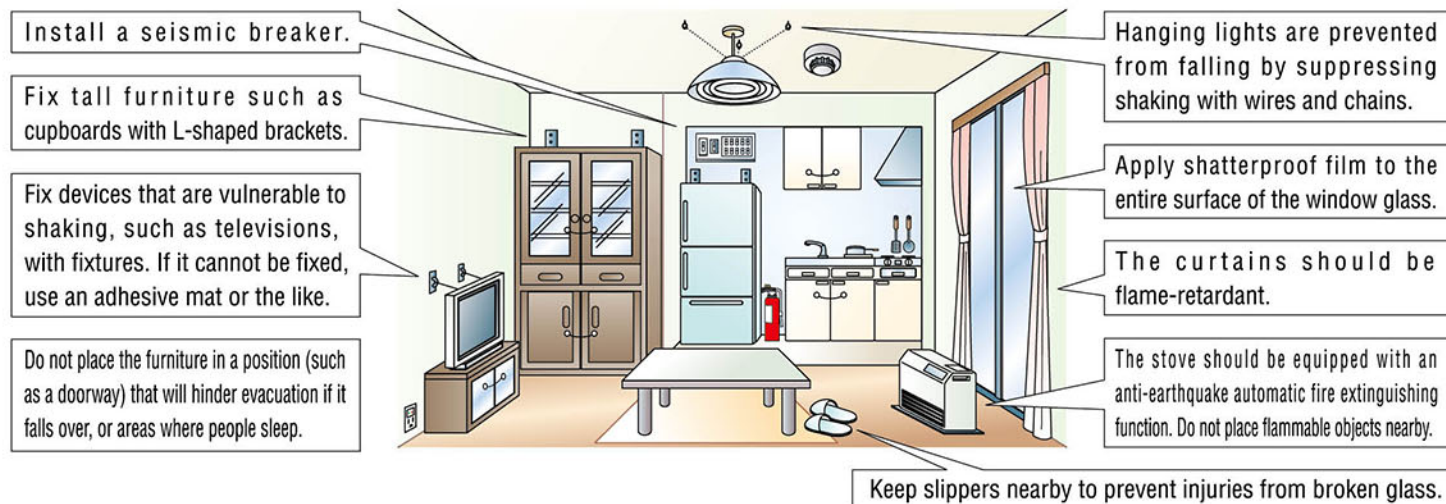
## Home Preparation



## Indoor Preparation

In past earthquakes, there have been many cases in which people were injured by overturned furniture even if their homes were safe, and they were forced to live in evacuation shelters because they were unable to clean up overturned furniture or broken glass. Let's practice safe room making now.

- Place large pieces of furniture together in a room with few people coming and going.
- Store heavy items on the bottom shelf.
- Do not place any objects in the entrance or hallways (they may interfere with evacuation).
- Do not place furniture that can tip over in rooms or bedrooms for the elderly or children.



### In Matsubushi Town, we are conducting a free simple seismic diagnosis for wooden houses built before 1981.

The earthquake resistance standards for houses were strengthened in 1981, but the Great Hanshin-Awaji Earthquake caused great damage to buildings constructed before then. In order to minimize such damage, it is important to improve the earthquake resistance of houses.

In Matsubushi Town, by having owners of wooden houses built before 1981 take a free simple earthquake resistance diagnosis, they will understand the necessity of earthquake resistance and promote improvement of earthquake resistance.

[Inquiries]  
Matsubushi Town Hall New Urban Area Development  
Section Development and Architecture Manager  
Telephone 048-991-1858/1806  
\*Diagnosis may not be possible depending on the structure and building area of the building.

## Furniture Safety Measures

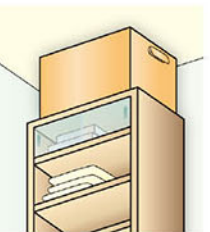
In a big earthquake, falling furniture and scattered tableware can delay escape and cause injuries. To prevent injury, attach L-shaped brackets to your furniture to prevent it from falling over. In rental housing, you can't always drill holes into the walls, so use a stick or sticky mat.

### Immediate fall prevention measures

- Place non-slip mats under furniture.
- In cupboards, bookshelves, etc., place heavy items on the bottom and light items on the top.

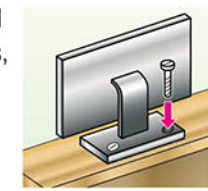


- Fill the gap between the furniture and the ceiling with a cardboard box with a weakly adhesive mat in between. Keep the gap between the ceiling and the cardboard box within 2 cm.

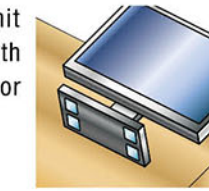


### How to fix furniture

- Secure the TV unit and the TV stand with bolts, etc.



- Fix the TV main unit and the TV stand with a strap-type device or an adhesive mat.

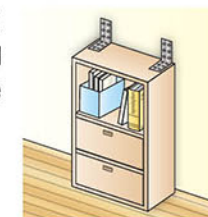


- Connect the TV body to the wall or pillar using ropes and heat-ons (metal fittings).

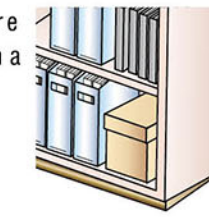


### Large furniture such as chests of drawers

- Fix the furniture and the wall with L-shaped brackets or belt-type devices.



- Tilt the furniture toward the wall with a stopper type device.



- Secure the space between the furniture and the ceiling with a tension rod or the like.



### How to fix furniture

- Two-tiered furniture is connected at the top and bottom with a connecting fixture (integration).



- Attach anti-jumping devices to drawers and hinged doors.



- Lay anti-slip sheets on bookshelves, etc., with restraint tape and equipment attached to them to prevent them from falling.



Reference: Ministry of Internal Affairs and Communications Fire and Disaster Management Agency website "How to prevent furniture from falling over during an earthquake" <https://www.fdma.go.jp/publication/database/kagu/>

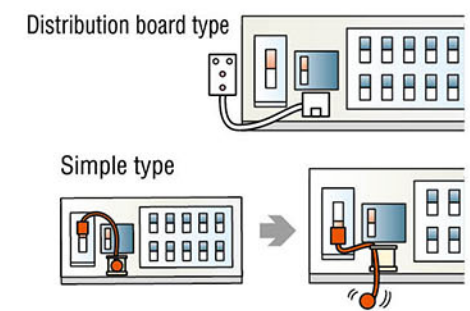
## Prevent Electrical Fires

A large percentage of fires caused by large-scale earthquakes in recent years have been caused by electricity.

To prevent electric fires, be sure to turn off the electric breaker when evacuating.

A seismic breaker is a device that automatically shuts off electricity by tripping the breaker when it senses a strong tremor. It is possible to prevent "electrical fires" that occur when the electrical wiring of damaged electrical appliances ignites when energized.

In addition to the breakers shown on the right, seismic-sensing breakers can be shut off by an outlet. Choose according to your home environment. Also, when installing a seismic breaker, it is necessary to install an emergency light that will turn on in the event of a power failure.



### Learning from the Past [In the case of the Great Hanshin-Awaji Earthquake]

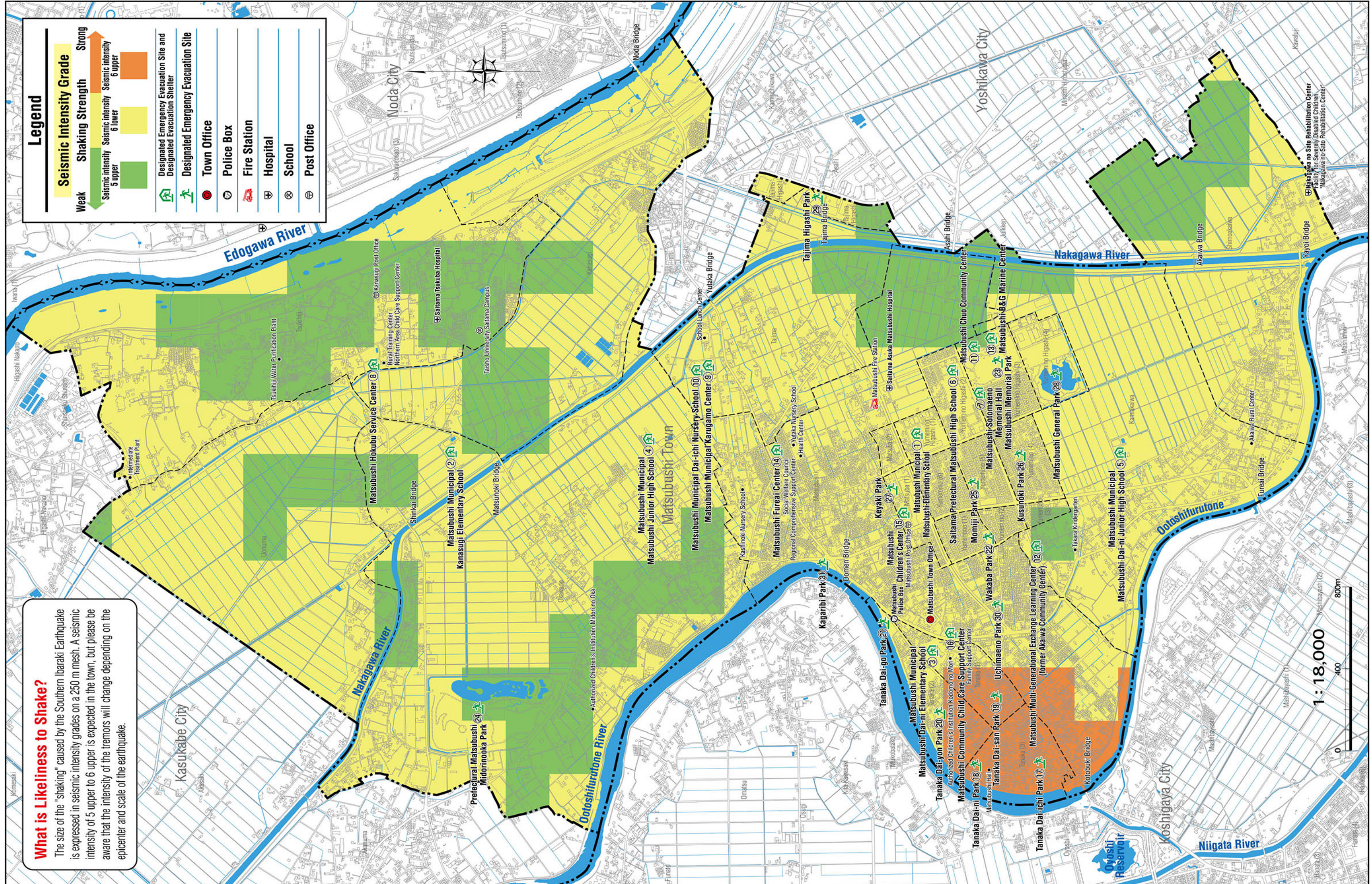
In the Great Hanshin-Awaji Earthquake, about 46% of injuries were caused by falling furniture. In a major earthquake, large pieces of furniture may move or topple over, and windows may break and scatter. In order to prevent injury due to an earthquake and to secure an indoor evacuation route, take measures to prevent furniture from tipping over or falling.



From the Architectural Institute of Japan "Report on damage to houses inside the Great Hanshin-Awaji Earthquake"



# “Likeliness to Shake” Map



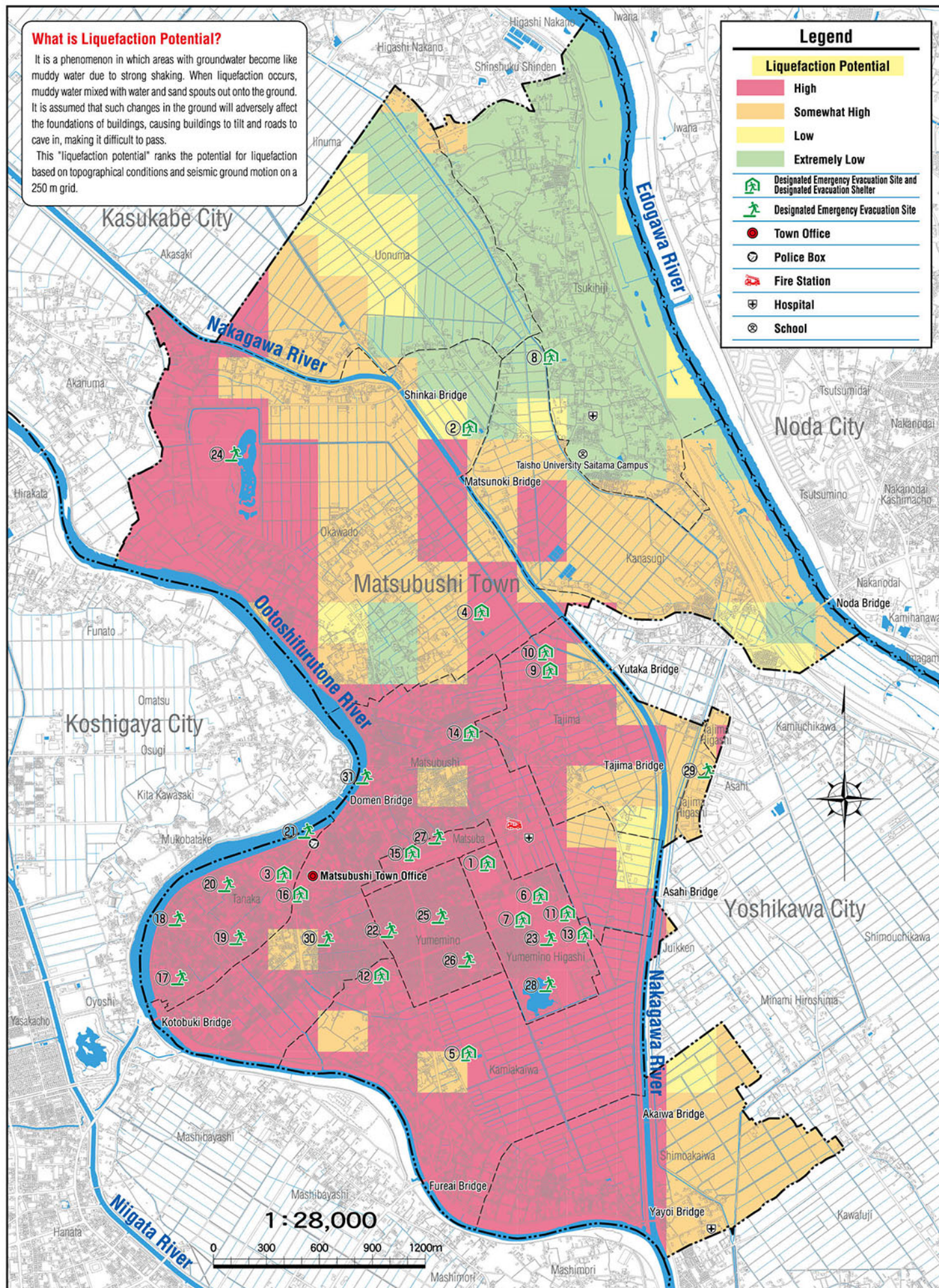




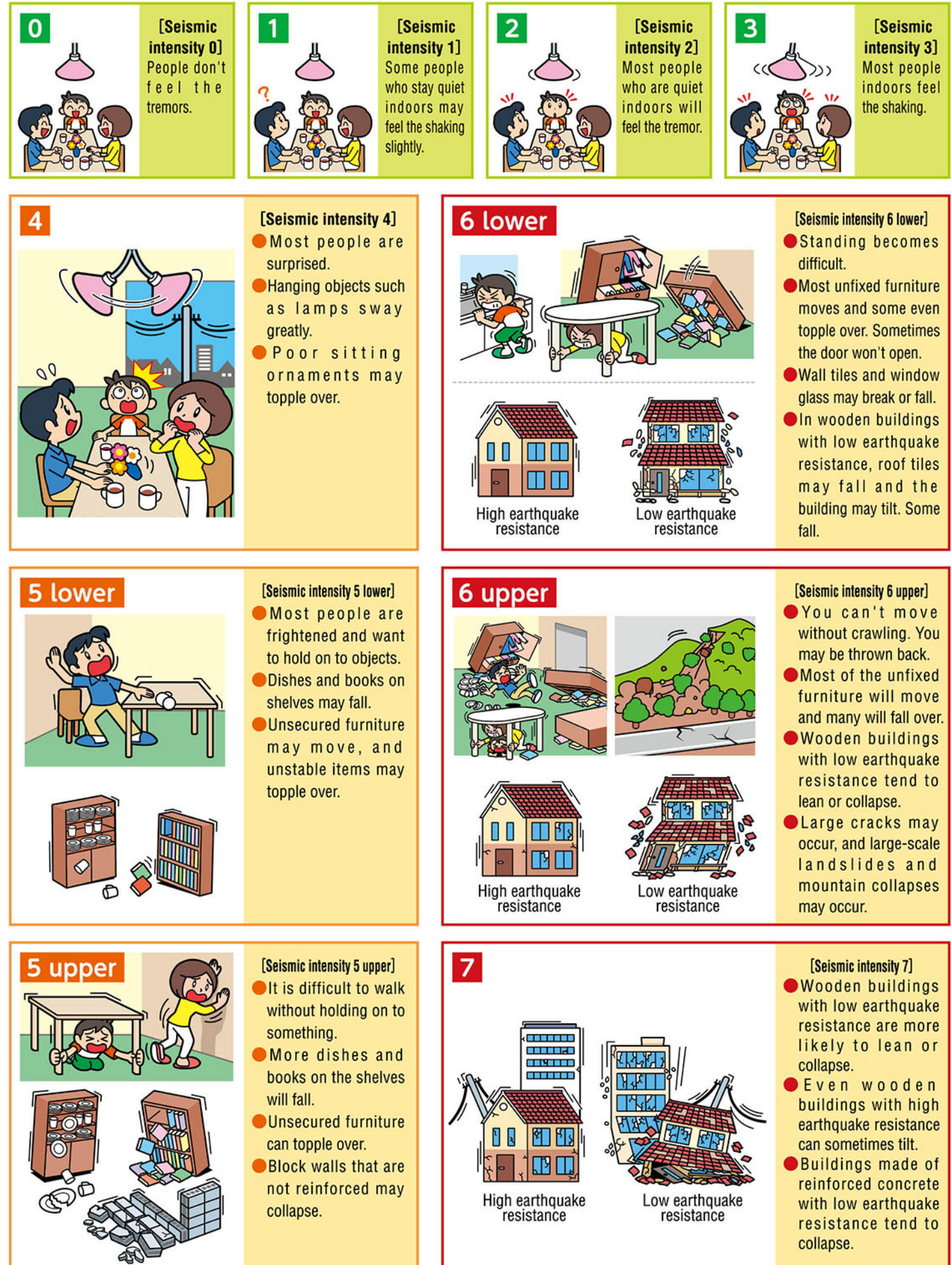
This "risk level" is ranked by 250 m mesh based on the percentage of expected building damage (total collapse of the building), taking into account the type of building (wooden/non-wooden construction), building year, etc.



# Liquefaction Potential Map



# Seismic intensity and shaking



Source: Partial excerpt from the Japan Meteorological Agency leaflet "What kind of shaking is that seismic intensity?"