

豊橋市南海トラフ地震被害予測調査

～調査結果の概要及び今後の地震防災・減災対策について～

平成26年8月28日 豊橋市防災会議公表

Report on the Predictions of Damage in Toyohashi that will be caused by the Nankai Trough Earthquake

A brief summary of the study results & measures to be taken for disaster prevention and damage reduction

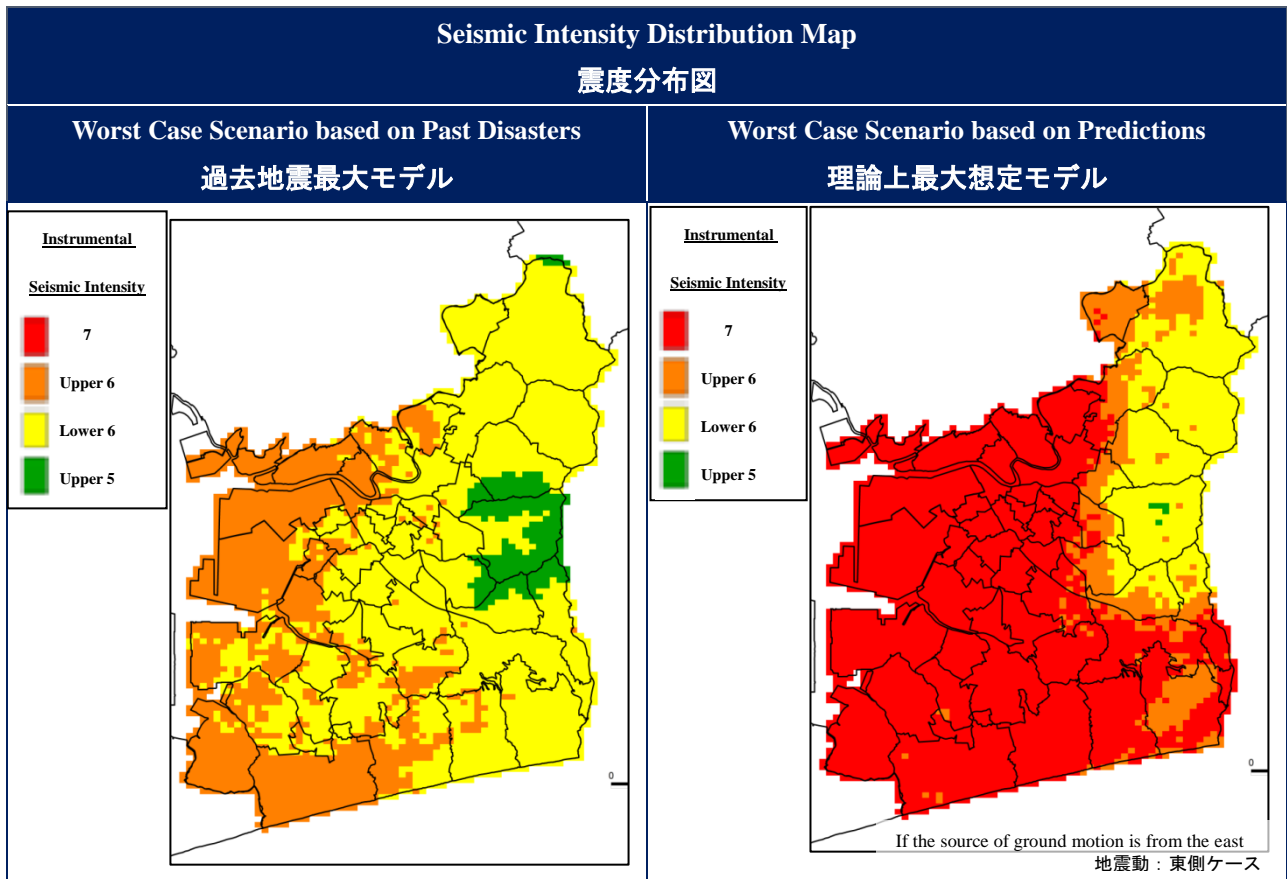
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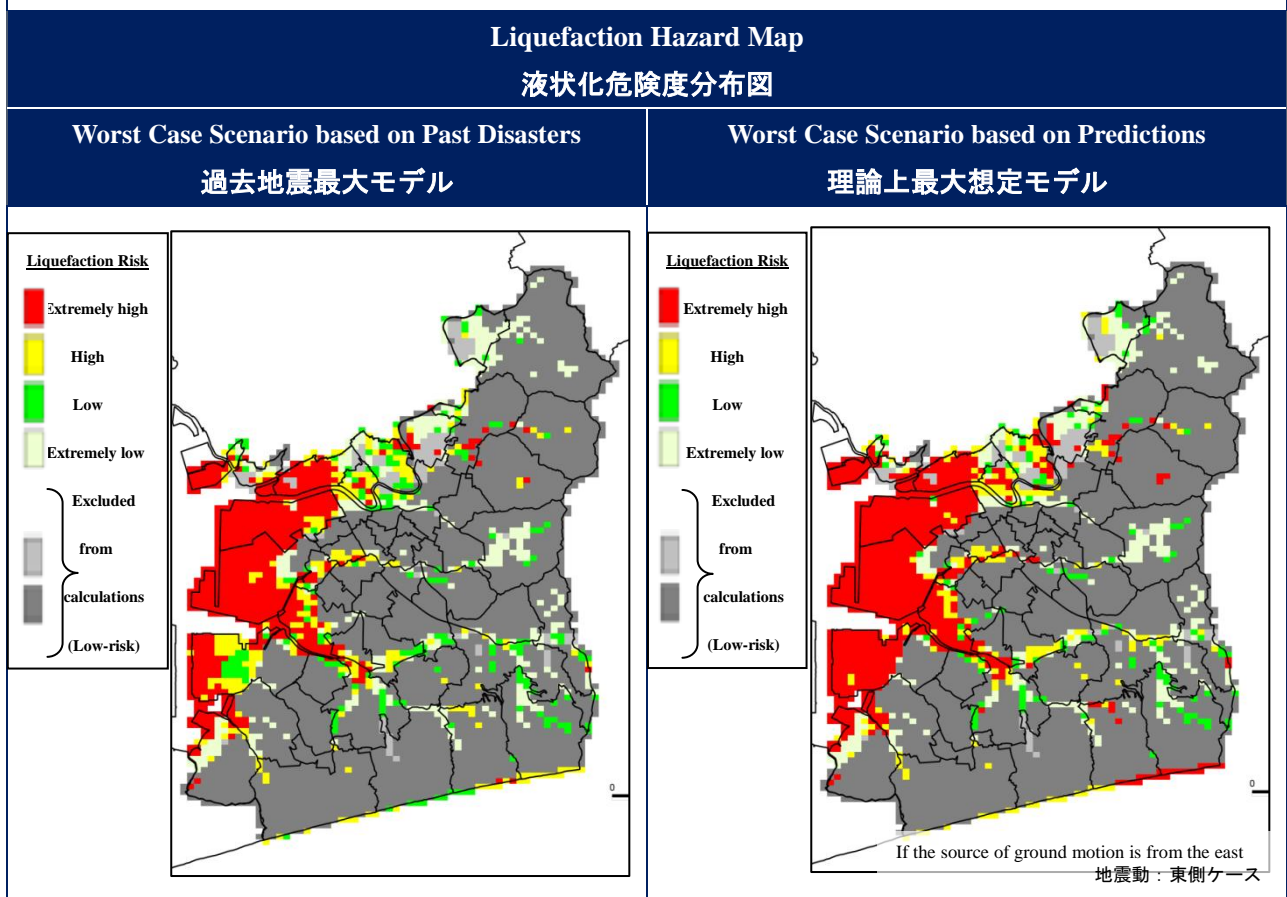
1. Earthquake/Tsunami Models in this study 調査対象とした地震・津波

C a t e g o r y 項 目	Worst Case Scenario based on Past Disasters 過去地震最大モデル		Worst Case Scenario based on Predictions 理論上最大想定モデル	
	S u m m a r y 概 要	<ul style="list-style-type: none"> The model is based on the earthquakes and tsunamis that have occurred repeatedly in the Nankai Trough region. The model is useful for the city's review on measures to be taken for disaster prevention during earthquakes and tsunamis. 		<ul style="list-style-type: none"> The model is based on the large-scale earthquakes and tsunamis that strike the Nankai Trough region once every thousand years or lesser. With the goal of protecting lives in mind, the model takes into account every possibility of a disaster, and as such, reflects the largest scale earthquake and tsunami.
Scale of earthquake 地震の規模	Undergoing Cabinet Office review		9.0 magnitude (Tsunami 9.1)	
Maximum seismic intensity 最大震度	Upper 6		7	
Shortest estimated Tsunami arrival time (With tsunami height of 30cm) 津波到達時間 (津波高30cm)	Mikawa Bay	Pacific Ocean	Mikawa Bay	Pacific Ocean
	77 minutes	7 minutes	77 minutes	4 minutes
Maximum tsunami height 最大津波高	2.7m	6.9m	2.9m	19.0m
Things to note 留意事項	<ul style="list-style-type: none"> This study is based on estimations and cannot be regarded as an accurate representation of an actual disaster. This study is focused mainly on the worst case scenario during earthquakes/tsunamis where the whole of Toyohashi city is expected to experience maximum damage according to the city's multiple reviews. 			

2. Estimation of seismic hazards ハザードの想定結果



According to the study's model of Worst Case Scenario based on Predictions, it is assumed that most of Toyohashi city will experience a seismic intensity of 7.



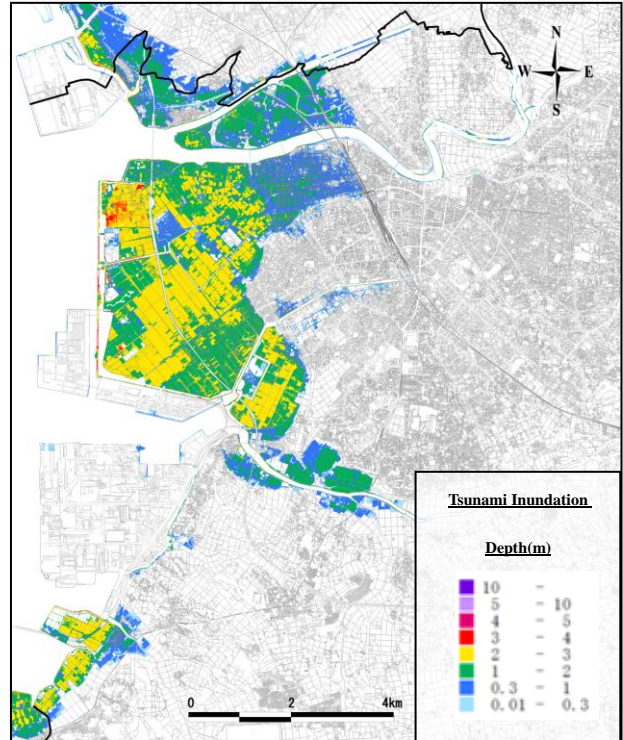
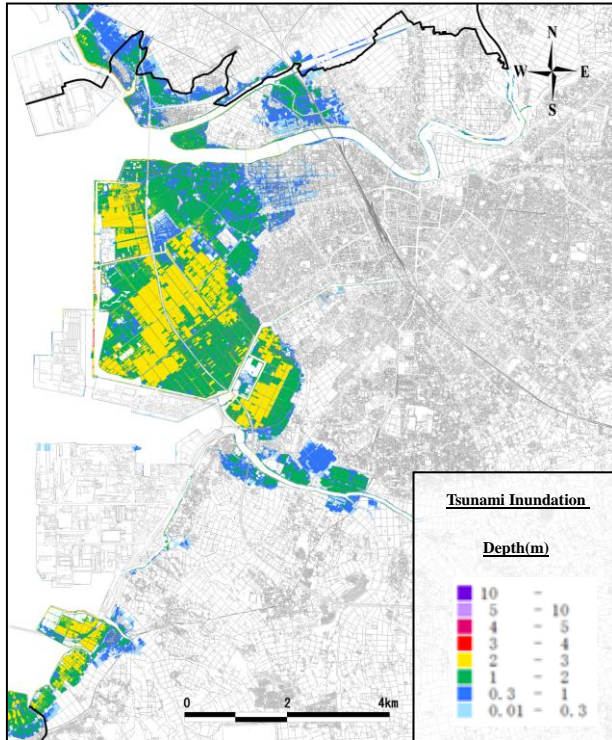
Liquefaction risk is calculated based on the assumption that liquefaction risk of the reclaimed and low-lying coastal areas around Mikawa Bay will be very high.

Tsunami Inundation and Maximum Tsunami Inundation Depth Map

津波浸水想定域及び最大浸水深分布図

Worst Case Scenario based on Past Disasters
過去地震最大モデル

Worst Case Scenario based on Predictions
理論上最大想定モデル



Tsunami of more than 30cm high from the Mikawa Bay is predicted to reach the city as soon as 77 minutes after the earthquake. It is important to evacuate to safety immediately after you experience shaking from an earthquake. As such, please decide and ensure in advance that you and your family will be able to evacuate to higher ground or a Tsunami Evacuation building (*Tsunami Hinan Biru*), etc. during an emergency.

3. Predicted Damage in Toyohashi City 被害予測結果（全市）

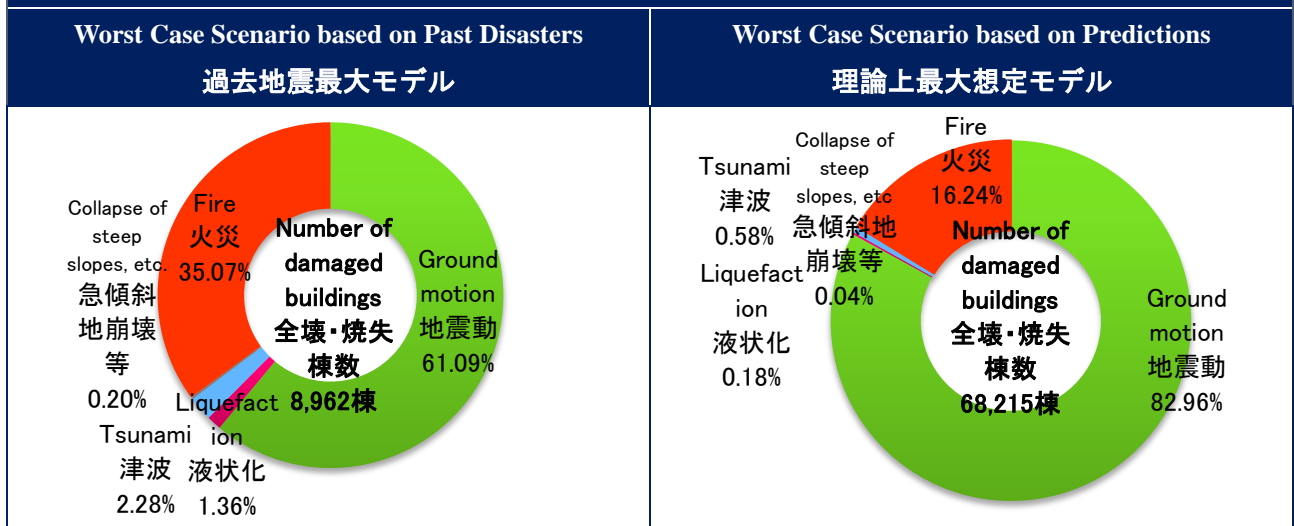
Category 区分		Worst Case Scenario based on Past Disasters 過去地震最大モデル	Worst Case Scenario based on Predictions 理論上最大想定モデル
Damage to Property (Number of buildings that have been fully damaged, or burned down) 建物被害 【全壊・焼失棟数】	Ground motion of the earthquake 地震動	5,475 buildings (61.09%)	56,592 buildings (82.96%)
	Liquefaction of the ground 液 状 化	122 buildings (1.36%)	125 buildings (0.18%)
	T s u n a m i 津 波	204 buildings (2.28%)	395 buildings (0.58%)
	Collapse of steep slopes, etc. 急 傾 斜 地 崩 壊 等	18 buildings (0.20%)	25 buildings (0.04%)
	F i r e 火 災	3,143 buildings (35.07%)	11,078 buildings (16.24%)
	T o t a l 合 計	8,962 buildings ※Disasters occurred in winter during the evening 冬・夕方発災	68,215 buildings ※Disasters occurring in winter during the evening 冬・夕方発災

Category 区 分		Worst Case Scenario based on Past Disasters 過去地震最大モデル	Worst Case Scenario based on Predictions 理論上最大想定モデル
Casualties (Number of deaths) 人的被害 【死者数】	Building Collapse 建 物 倒 壊	197 persons (47.58%)	3,047 persons (64.38%)
	Flooding/Tsunami 浸 水 ・ 津 波	67 persons (16.18%)	926 persons (19.56%)
	Collapse of steep slopes, etc. 急 傾 斜 地 崩 壊 等	1 person (0.24%)	2 persons (0.04%)
	F i r e 火 災	148 persons (35.75%)	758 persons (16.02%)
	O t h e r s そ の 他	1 person (0.24%)	0 persons (0%)
	T o t a l 合 計	414 persons ※Disasters occurred in winter during the evening 冬・夕方発災	4,733 persons ※Disasters occurring in winter in midnight 冬・深夜発災

According to the method used by the Central Disaster Management Council (*Chuo Bosai Kaigi*) and Aichi Prefecture, the data on predicted damage has been calculated by multiplying the data on the number of buildings by the rate of damage (fixed rate by the Prefecture).

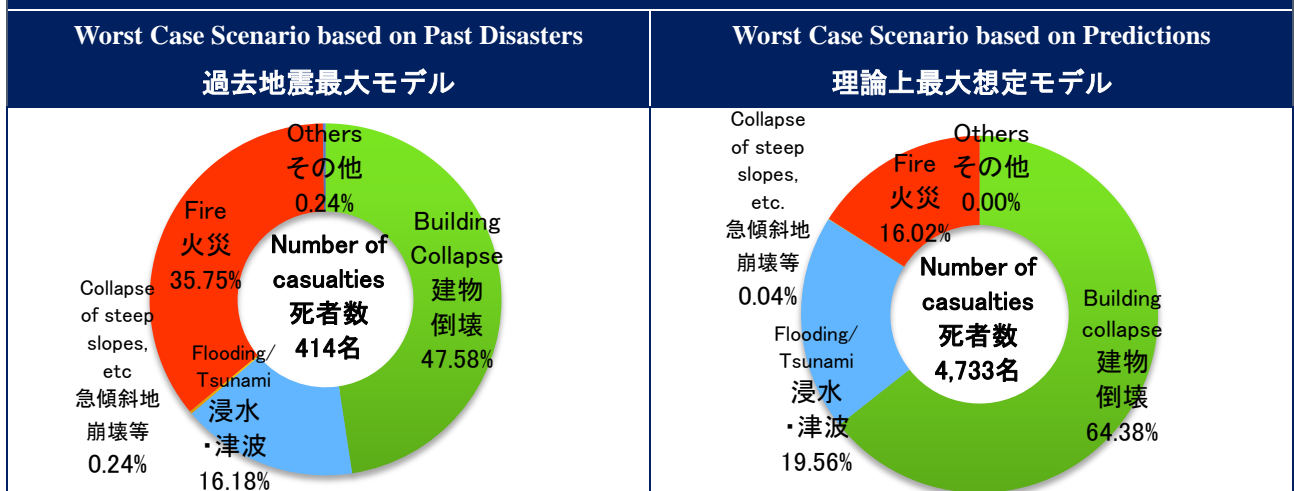
Causes of damage for buildings that have been completely damaged or burned down

全壊・焼失原因別内訳



Causes of casualties

死亡原因別内訳



Many people are worried about damage and casualties that will be caused by tsunami in Toyohashi after witnessing the damage caused by the Great East Japan (Tohoku) Earthquake. However, this study reveals that the number of casualties caused by building collapse or by being trapped under collapsed buildings, etc. is very high. This study also highlights the high number of casualties caused by fire.

4. Steps you should take to prepare for times of emergencies 減災効果の想定で前提とした対策項目

(1) Emergency Preparedness 対策項目	(2) Damage reduction 減災効果
<p>① Ensure that the building is 100% earthquake-resistant 建物の耐震化率 100%の達成</p> <p>② Ensure that furniture is 100% secured firmly and prevented from falling 家具の転倒・落下防止対策実施率 100%の達成</p> <p>③ Ensuring fast, complete evacuation in the event of disaster 全員が発災後すぐに避難開始</p> <p>④ The active use of Tsunami Evacuation Buildings (Tsunami Hinan Biru) 津波避難ビルの有効活用</p> <p>⑤ Fire prevention 出火防止対策の推進</p> <p>⑥ Ensuring the ability to extinguish fire in its initial stages 初期消火対策の推進</p>	<p>① Damage to Property 建物被害 Reduced by around 40 – 50% 約 4 割～約 5 割減少</p> <p>② Casualties 人的被害 Reduced by around 40 – 80% 約 4 割～約 8 割減少</p>
<p>We strongly encourage all households to ensure that the building is earthquake-resistant and that furniture are secured firmly and prevented from falling in order to be prepared for emergencies. It is important to take the abovementioned precautions to be prepared for emergencies such as earthquakes and tsunamis and reduce the potential damage that may be caused by these disasters.</p>	

5. Precautions to be taken to protect you and your family 「命を守る」ための事前の備えについて

(1) Ensuring that your residence is earthquake-resistant 住宅の耐震化

To protect your house from earthquake damage, please ensure that the building is earthquake-resistant as soon as possible. The City of Toyohashi offers the following support to help ensure that your house is earthquake-resistant. If you have any general enquiries, please contact the Foreign Resident Advisory Room (*Gaikokujin Sodan-shitsu*, TEL: 0532-54-8205). For more information about whether your building is earthquake-resistant and how to take precautions, please enquire at the Building Regulations Division (*Kenchiku Shido-ka*, TEL: 0532-51-2581, Japanese only).

■Free seismic diagnosis (earthquake resistant test) for wooden residences (Only residences meeting all of the following criteria will be eligible)

木造住宅無料耐震診断(下記の①～③をすべて満たす建物が対象です。)

① Buildings constructed before 31 May 1981 昭和 56 年 5 月 31 日以前に着工された建物、② Detached house residences (*ikkodate jutaku*), or shophouses and other types of combined housing 一戸建て住宅、店舗等併用住宅、③ Buildings that are currently used as residences 現在、人が住んでいる建物

■If the building is proven to have low earthquake resistance after the diagnosis, the following 4 subsidies are available to help you. 診断の結果、耐震性が低かった場合、以下の 4 つの補助制度があります。

① Subsidy for earthquake-resistance renovation for wooden residences (a maximum subsidy of ¥1,200,000) 木造住宅耐震改修工事費補助(上限 120 万円)、② Subsidy for the different phases in earthquake-resistance renovation for wooden residences (A maximum subsidy of ¥600,000 for the 1st phase, and a maximum of ¥300,000 for the 2nd phase) 木造住宅段階的耐震改修工事費補助(上限 1 段階目 60 万円、2 段階目 30 万円)、③ Subsidy for demolition of wooden residences (a maximum subsidy of ¥200,000) 木造住宅解体工事費補助(上限 20 万円)、④ Subsidy for maintenance costs of emergency shelters (A maximum subsidy of ¥300,000) 耐震シェルター整備費補助(上限 30 万円)

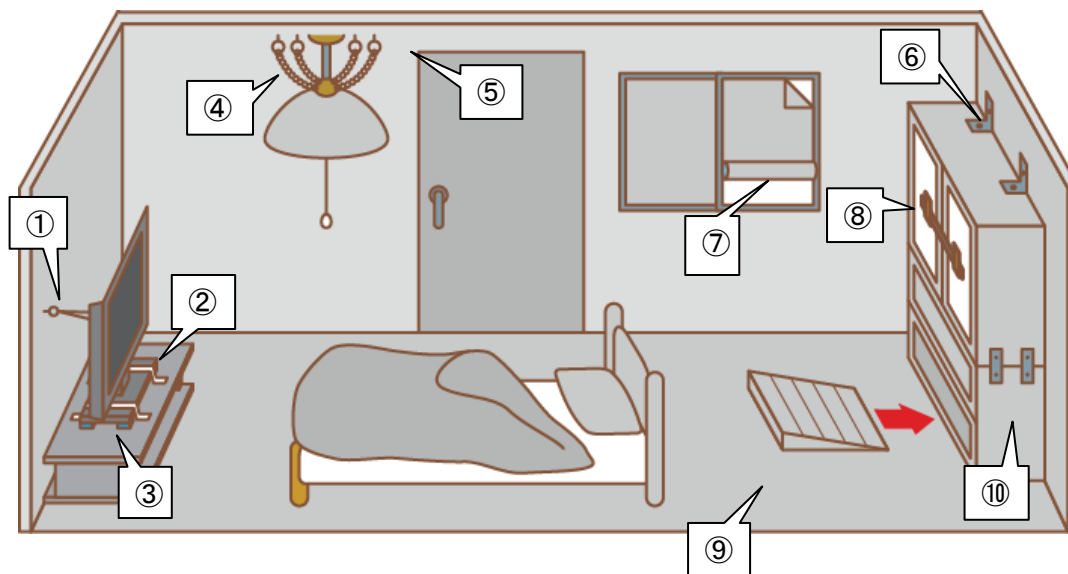
■For residences other than wooden residences 非木造住宅

① Subsidy for seismic diagnosis for residences other than wooden residences (There is a limit to the amount of subsidy.) 非木造住宅の耐震診断費補助制度(上限 診断対象経費の3分の2以内の額)、② Subsidy for earthquake-resistance renovation for residences other than wooden residences (There is a limit to the amount of subsidy. For more information, please enquire at the Building Regulations Division (*Kenchiku Shido-ka*)) 非木造住宅の耐震改修費補助制度(上限額があります。詳細については建築指導課にお問い合わせください。)

※All information is true as of April 2014.

(2) Ensuring that furniture are secured firmly and prevented from falling 家具の転倒・落下防止

While your building may be stable during an earthquake, there is a possibility that furniture such as cupboards and refrigerators, televisions, microwaves and lamps may topple and fall. The furniture that you use daily may be a murder weapon. It is important to ensure that your furniture is secured firmly and prevented from falling to prepare for emergencies.



- ① Secure the furniture to the wall with bands and prevent it from toppling either front or backwards.
- ② Secure the TV to the TV stand with straps.
- ③ Place a seismic mat (adhesive mat) below the television.
- ④ Please strengthen all hanging furniture with brackets and chains, etc. in several areas.
- ⑤ Ceiling lamps attached directly to the ceiling are recommended.
- ⑥ Secure the furniture to the wall with L-shaped brackets
- ⑦ Place anti-shatter film on the inside of all windows, and the outside for glass doors of cupboards or desks, etc.
- ⑧ Secure cupboard doors with latches.
- ⑨ If there is space between the furniture and the walls or pillars, it may topple easily. To avoid this, place a board under the furniture so that it is leaning against the wall to prevent it from toppling over.
- ⑩ Secure all furniture placed on top of furniture with brackets.

(3) Emergency Rations 飲料水・食料の備蓄

When the Nankai Trough Earthquake strikes, there is a high possibility that the distribution of necessities and other types of support will be disrupted. As such, we have advised all households to prepare at least 3 days' worth of emergency rations. However, the Cabinet Office has recently advised all households to prepare at least 7 days' worth of potable water and food for emergency rations.

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