Introduction to the Building Standard Law

- Japanese Building Codes and Building Control System -

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Abbreviation

The BSL	The Building Standard Law
MLIT	The Ministry of Land, Infrastructure, Transport and Tourism
The Minister	The Minister of Land, Infrastructure, Transport and Tourism

Related Organizations

Name	Comments regarding responsibilities
The Minister	2-2 (1)
Designated Administrative Agency	2-2 (2)
Designated Confirmation and Inspection Body	2-3 (2)
Designated Structural Calculation Review Body	2-3 (4)
Designated Evaluation Body	3-2
Designated Approval Body	3-4 (1)

Chapter 1 Features of the Building Standard Law and Related Laws

1-1 Background

(1) Conflagrations

The traditional Japanese building method is the wooden structure. Before the introduction of the brick structure in the 1860s, and the introduction of the steel structure and reinforced concrete structure in 1900-1920, the wooden structure was the dominant type of structure, including structure for public use, temples, shrines, and commercial use. Even now, most newly-built detached houses are wooden structures (**Annex 1**). On the other hand, Japan has a characteristic climate of dry air in winter, seasonal strong winds and foehn phenomena that arises in certain areas because of the mountainous land. Densely-built wooden buildings and the characteristics of climate produce a very high threat of fires – both small and large.

Therefore, it has been one of the main concerns in building control to prevent conflagrations by means of covering roofs and exterior walls with noncombustible materials, especially in central urban areas. Such restrictions have been in effect in Japan for around 350 years.

(2) Earthquakes

Japan is an earthquake-prone country, lying to the west of the circum-Pacific earthquake belt. Japan, therefore, has sustained serious damage due to earthquakes throughout its long history. The Great Kanto Earthquake (1923) caused simultaneous outbreaks of fire in many places, with approximately 450,000 buildings being destroyed by fire, and some 143,000 persons dead or missing. In the Great Hanshin-Awaji Earthquake (1995), 104,906 buildings collapsed, and 6,148 buildings were destroyed, causing 6,433 deaths. It is estimated that 80 % of the deaths were due to falling buildings or furniture.

Therefore, one of the main concerns in building control has been to construct buildings that can withstand earthquakes. The Japanese Building Code has required structural calculation in considering seismic force since 1924. This was the first such requirement in the world.

(3) Fire incidents

After large buildings became popular, there were sometimes conflagrations in these buildings. Some examples are shown in **Table 1**.

Therefore, such buildings are required to have fire alarm systems, staircases for emergencies (and for ordinary use), fire-resistance capabilities, fire extinguishing systems, and so on.

Table 1 Incidents of Large fires in large buildings

Year	Building name	Prefecture	Use	Number of deaths
1972	Sen-nichi Department store	Osaka	Department store	118
1973	Taiyo Department store	Kumamoto	Department store	100
1980	Kawaji Prince Hotel	Tochigi	Hotel	45
1982	Hotel New Japan	Tokyo	Hotel	33

(4) Typhoon and snow

Japan is also situated in the path of typhoons. Buildings face the threat of strong winds from typhoons, and buildings near mountains are threatened by landslides caused by heavy rainfall of typhoons.

Therefore, buildings must be able to resist the strong winds from typhoons. The possibility of landslides must be considered when planning for construction near mountains.

Additionally, in the northern part of Japan, the weight of accumulated snow on roofs must be considered.

(5) Health

In order to secure the health of occupants and public health in general, buildings must have an adequate sanitary system, to prevent sick house issues, and so on.

(6) City planning

From the viewpoint of city planning, buildings are required to be designed within a certain height, to meet land-use planning, and so on.

1-2 Purpose of the BSL

The BSL was enacted in 1950, and since then has been subject to many revisions, in accordance with advances in technology and incidents of building disasters that have occurred. The purpose of the BSL is to protect the lives and property of the public from disasters, such as earthquakes, typhoons and fires, and also to maintain public health by ensuring environmental sanitation.

1-3 Features of the BSL

(1) For all buildings

The BSL is a law that applies to all buildings throughout Japan. However, the standards that it provides for are not uniform throughout the country because additional standards are determined in accordance with regional conditions. For example, the method of structural calculation and fire safety must take into account factors such as snow accumulation, earthquake activity and other conditions of each area.

(2) Restrictive law

The BSL is enforced through administrative procedure, and all buildings must conform to requirements determined by the BSL and the documents under the BSL. For example:

(a) It is required to have both a building confirmation and inspection by a building official or a fair and impartial private sector organization (a designated checking and inspection organization) to determine whether the building is in compliance with the BSL and other laws concerning buildings.

(b) Additionally, it prescribes that the Designated Administrative Agency (see **2-2(2)**) has the power to call a halt to the construction of a building or to order the demolition or prohibition of the use of buildings that are judged to be in violation of the BSL.

(3) Covering the main parts of the building codes

Technical requirements based on the BSL cover the fields below:

(a) Structural safety
(b) Fire safety
(c) Hygienic safety

They are the main parts of the building codes, but it is not a complete list. For example, the BSL does not cover technical requirements for fire extinguishing equipment. They are covered by the Fire Service Law. (Details are shown in 1-4.)

(4) Covering the fields of zoning codes

Technical requirements based on the BSL cover not only the main parts of the building codes, but also basic requirements for zoning codes. The BSL and documents under the BSL cover the basic requirements of zoning codes, which are:

(a) mandatory and apply to every building in the City Planning Area and Quasi City-Planning Area designated by city planning;
(b) aimed to secure buildings to fulfill city planning; and
(c) and which stipulate:
- building use regulations;
- height regulations from the viewpoint of landscape/cityscape; and
- others.

(5) From construction of a building until its destruction or demolition

The BSL is applied continuously from the time of construction of a building to the time of its destruction or demolition. It therefore provides regulations that stipulate maintenance and periodic inspections of buildings.

1-4 Laws related to the building codes

The BSL is the main law relating to the building codes. But there are some other laws relating to the fields of the building codes and related fields as shown in **Table 2**.

Table 2 The BSL and related laws

<table>
<tr><td rowspan="2"></td><td colspan="6">Fields of building codes and related fields</td></tr>
<tr><td colspan="2">Fire safety</td><td rowspan="2">Structural safety</td><td rowspan="2">Hygienic safety</td><td rowspan="2">Accessibility</td><td rowspan="2">Energy saving</td></tr>
<tr><td>Fire extinguishing equipment, etc.</td><td>Fire-resistance, evacuation, etc.</td></tr>
<tr><td>Restrictive laws</td><td>Fire Service Law</td><td colspan="3">Building Standard Law</td><td rowspan="2">Barrier-free Law</td><td rowspan="2">Energy Saving Law</td></tr>
<tr><td>Promotional laws</td><td></td><td></td><td>Seismic Retrofitting Law</td><td>Building Management Law</td></tr>
</table>

1-5 Fire Service Law

The purpose of the Fire Service Law is:

(a) to prevent, detect and extinguish fires, and to protect people's lives, health, and property from fires; and

(b) to minimize damage caused by fires, earthquakes, and other disasters.

The Law requires that certain buildings be equipped with fire extinguishing equipment, such as automatic sprinkler systems. Fire departments of local governments are in charge of the administration of the Law. The allocation of roles of the BSL and the Fire Service Law are shown in **5-1**.

1-6 Barrier-free Law

Building-related provisions of the Barrier-free Law stipulate:

(a) Restrictions of the standard; and

When undertaking certain types of construction work of a special specified building[*1] of a certain size, or larger, accessibility and mobility standards[*3] must be complied with.

(b) Promotion of the standard;

Building owners undertaking certain types of construction work of a specified building[*2] must make efforts to comply with accessibility and mobility standards[*3].

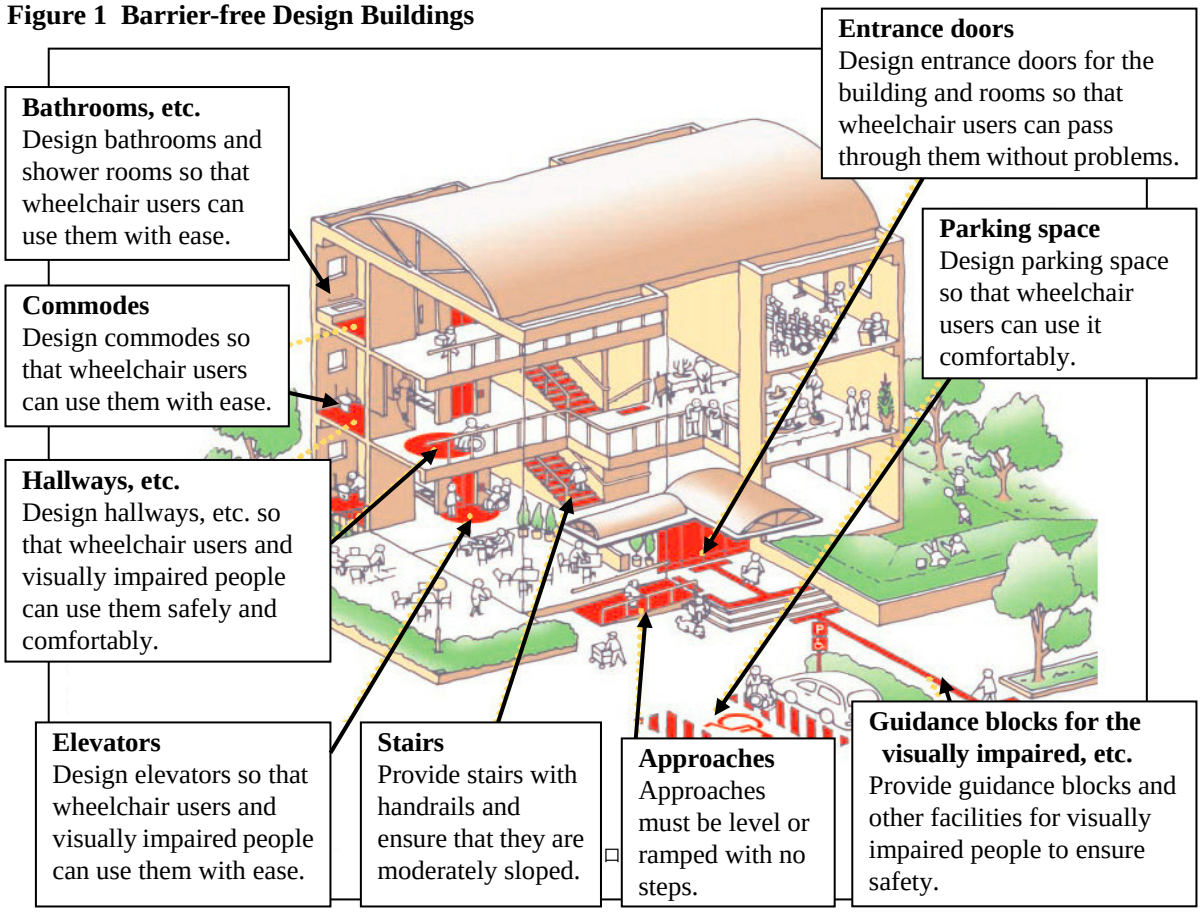
*1. Special specified buildings are any specified buildings[*2] used by many, and unspecified persons, or those used primarily by the elderly or physically disabled. Examples are hospitals, theaters, assembly halls, department stores, hotels, and homes for the aged.

*2. Specified buildings are buildings used by many people, such as schools, hospitals, theaters, assembly halls, department stores, hotels, offices, apartments, and factories.

*3. Examples of accessibility and mobility standards are:

- the securing of a hallway wide enough to allow for a wheelchair user and a passer by; and
- installation of at least one commode designed for wheelchair users.

Figure 1 Barrier-free Design Buildings



1-7 Energy Saving Law

Building-related provisions of the Energy Saving Law stipulate as below:

(a) Mandatory notification

Owners of buildings (including residential buildings) with a total floor area of 2,000 m^2 or more, who undertake new construction or large-scale renovation projects are subject to mandatory notification to a *Competent Administrative Agency*[*1], with regard to energy conservation measures.

If the notification includes extremely inadequate matters in comparison with the judgment criteria issued by the Ministers, the *Competent Administrative Agency* issues a directive. If the owner does not follow the directive, the *Competent Administrative Agency* may publish the fact or issue an order. If the owner does not follow the order, the owner will be fined.

For building owners who have notified the *Competent Administrative Agency*, they must file regular reports on the state of maintenance:

If the report includes extremely inadequate matters in comparison with the judgment criteria, the *Competent Administrative Agency* issues recommendations.

*1: The *Competent Administrative Agency* is a term defined in the Energy Saving Law. Most of them are *Designated Administrative Agencies* defined in the BSL.

(b) Obligation of building owners to make certain efforts

Building owners must make efforts to contribute to the rationalization of energy use in buildings. The competent administrative agency provides building owners who undertake the construction or renovation of specified buildings with guidance and advice on the design, construction, and maintenance of buildings. The Minister releases guidelines on the design and construction of buildings (known as *Energy Conservation Standards*).

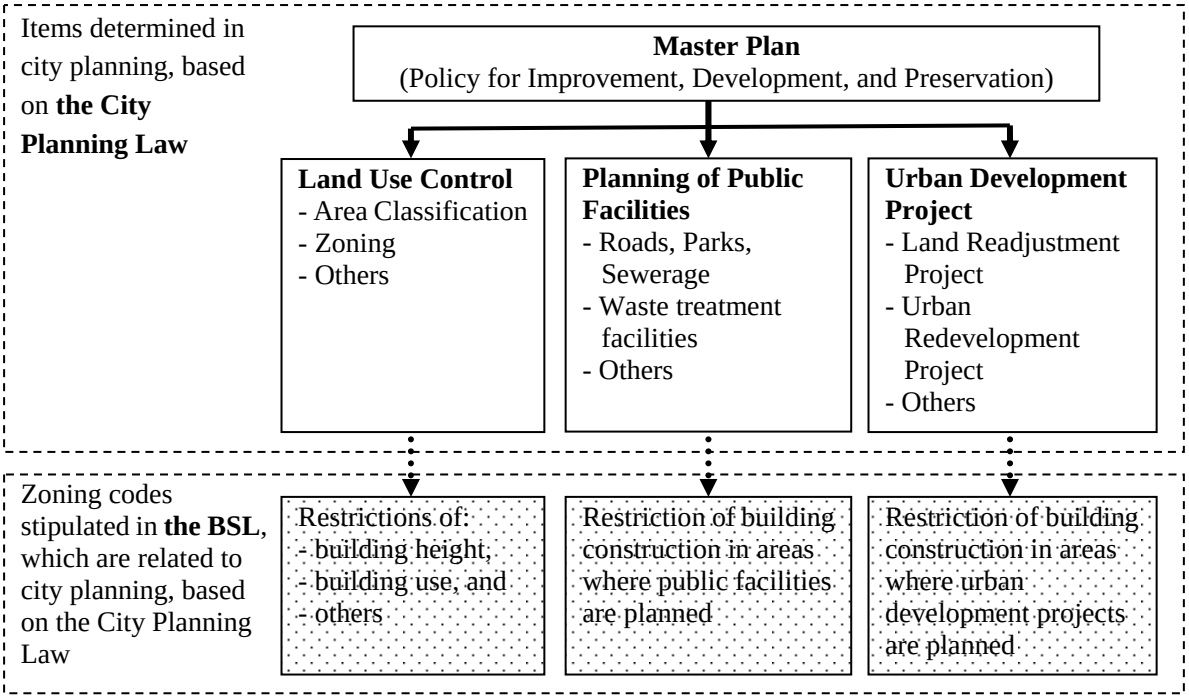
1-8 City Planning Law

The City Planning Law provides for:

(a) The items to be determined by city planning;
(b) The procedure for deciding them;
(c) Restrictions concerning city planning; and
(d) City Planning projects.

The aim is to realize the sound development and systematic improvement of cities. The items determined by city planning are classified into three categories, as shown in **Figure 2**. Zoning codes stipulated in the BSL are related to the city planning based on the City Planning Law.

Figure 2 Relationship between the City Planning Law and the BSL



1-9 *Kenchiku-shi* Law

The *Kenchiku-shi* system is a national qualification system under the *Kenchiku-shi* Law. *Kenchiku-shi* are licensed:

- to design buildings; and
- to work as an *owner's superintendent* (*) of construction work;
- etc.

"To design buildings" includes both;

- the role of architect, such as making architectural drawings and specifications, and
- the role of building engineer, such as performing structural calculations, and MEP (mechanical, electrical, and plumbing) system design.

Thus, *Kenchiku-shi* have the dual role of architect and building engineer, while many countries have separate licensing systems for architects and building engineers.

(*) **Work as an *owner's superintendent***

Superintendence of construction works is done by both an owner's party and a builder's party in Japan. Their responsibilities are shown as below.

(a) A *builder's superintendent* is an employee of the builder and is responsible for overseeing building construction on behalf of the builder to assure good quality.

(b) An *owner's superintendent* is responsible for examining building construction on behalf of the building owner, to determine whether or not the said construction follows the drawings/specifications made by a *Kenchiku-shi*.

Builders are allowed to engage in construction of buildings that they themselves have designed. Actually, many buildings (especially small buildings, such as detached houses) are constructed by the same company that designed the buildings. In almost all of these cases, *owners' superintendents* are assigned from these companies.

The qualifications of *Kenchiku-shi* are classified into three types:

(1) *1st-class Kenchiku-shi*;

(2) *2nd-class Kenchiku-shi*; and

(3) *Mokuzo* (wooden structures) *Kenchiku-shi*.

The *Kenchiku-shi* Law stipulates the use, structure, height, etc. of buildings, that only *Kenchiku-shi* may design and work as an *owner's superintendent* of construction work, etc., as shown in **Table 3**.

Table 3 Scope of Activity by Type of *Kenchiku-shi*

<table>
<tr><td colspan="2" rowspan="3">Height and structure

Total floor area
(S; m²)</td><td colspan="5">height of building ≦13m and height of eave ≦9m</td><td rowspan="3">height of building >13m or height of eave > 9m</td></tr>
<tr><td colspan="3">Wooden</td><td colspan="2">Non-wooden</td></tr>
<tr><td>1 story</td><td>2 stories</td><td>3 stories or more</td><td>Up to 2 Stories</td><td>3 stories or more</td></tr>
<tr><td colspan="2">S≦30</td><td colspan="2" rowspan="2">A</td><td rowspan="2"></td><td>A</td><td rowspan="2"></td><td rowspan="8"></td></tr>
<tr><td colspan="2">30<S≦100</td></tr>
<tr><td colspan="2">100<S≦300</td><td colspan="2">B</td><td></td><td colspan="2" rowspan="2"></td></tr>
<tr><td colspan="2">300<S≦500</td><td colspan="3" rowspan="2">C</td></tr>
<tr><td rowspan="2">500<S ≦1,000</td><td>General-purpose buildings</td><td colspan="3" rowspan="2"></td></tr>
<tr><td>Special-purpose buildings</td><td colspan="3">D</td></tr>
<tr><td rowspan="2">1,000<S</td><td>General-purpose buildings</td><td>C</td><td colspan="5" rowspan="2"></td></tr>
<tr><td>Special-purpose buildings</td></tr>
</table>

A: Anyone can engage in this.

B: Only *1st-class Kenchiku-shi*, *2nd-class Kenchiku-shi*, or *Mokuzo Kenchiku-shi* may engage in this.

C: Only *1st-class Kenchiku-shi*, or *2nd-class Kenchiku-shi* may engage in this.

D: Only *1st-class Kenchiku-shi* may engage in this.

Note: *Special-purpose buildings* refer to schools, hospitals, theaters, cinemas, grandstands, public halls, assembly halls with auditoriums, and department stores.

New qualifications, (a) and (b), and new related requirements were added by amendment of the Law (2006) as below:

(a) *1s-class Structural Design Kenchiku-shi*

In the case of buildings over a certain size, either of the following is required:

(1) A *1st-class Structural Design Kenchikushi* designs the building, and also examines that the building meets the relevant codes and standards for building structures.

(2) A *1st-class Kenchikushi* designs the building, and a *1st-class Structural Design Kenchikushi* examines that the building design meets the relevant codes and standards for building structures.

(b) *1st-class Building Equipment Kenchiku-shi*

In the case of buildings over a certain size, either of the following is required:

(1) A *1st-class Building Equipment Kenchikushi* designs the building, and also examines that the building meets the relevant codes and standards for building equipment.

(2) A *1st-class Kenchikushi* designs the building, and a *1st-class Building Equipment Kenchikushi* examines that the building design meets the relevant codes and standards for building equipment.

Chapter 2 Building Control System

2-1 Official Documents

Building control systems and technical requirements based on the BSL are provided in:

(1) The BSL (the Building Standard Law)

(2) Official documents of the Central Government under the BSL, including:

- The *Enforcement Order*, issued by the Cabinet;
- The *Enforcement Regulation of MLIT*;
- The *Ministerial Order Concerning Designated Qualifying Examination Body and Others*; and
- *MLIT Notifications*;

(3) Official documents of the local government under the BSL, including:

- Bye-laws of local governments; and
- Enforcement Regulations of local governments

in response to their local conditions.

2-2 Administrative Bodies

(1) The Minister

The *Minister of Land, Infrastructure, Transport, and Tourism* is responsible for the BSL. The power and commission of the Minister includes:

(a) submissions of proposals to the Japanese Diet for amendments to the BSL;

(b) submissions of proposals to the Cabinet for amendments to the Enforcement Order;

(c) issuance of:

- The *Enforcement Regulation of MLIT*;
- The *Ministerial Order Concerning Designated Qualifying Examination Body and Others*; and
- *MLIT Notifications*;

(d) conducting qualifying examinations for building regulation conformity inspectors, and the registration of qualified people;

(e) designating:

- *Confirmation and Inspection Bodies*;
- *Performance Evaluation Bodies*;
- *Approval Bodies*; and
- Others

(*Confirmation and Inspection Bodies* whose scope of work is limited within a specific prefecture are designated by the prefectural governors.)

(f) giving the necessary orders to the designated bodies mentioned in (f);

(g) approving building materials, building components and building designs that meet performance criteria, but do not satisfy sample specification/*Deemed-to-Satisfy Provisions* nor *Ordinary Verification Methods*; and

(h) others.

(2) Designated Administrative Agency

There are two levels of local governments in Japan; prefectures and basic local governments.

(a) Japan consists of 47 prefectures.

(b) Japan consists of 1,797 basic local governments, including 783 cities, 800 towns, 191 villages, and 23 wards in Tokyo. (The number of local governments is as of 28 September 2009.)

All prefectures and many basic local governments conduct building control administration as a *Designated Administrative Agency*. Building officials under the *Designated Administrative Agencies* are in charge of:

(a) building confirmation; and

(b) on-site inspections.

Designated Administrative Agencies are in charge of:

(c) receipt of reports of periodic inspections; and

(d) measures against violations.

The responsible agency of each area is as shown in **Table 4**.

Table 4 *Designated Administrative Agency* in response to the area and the building

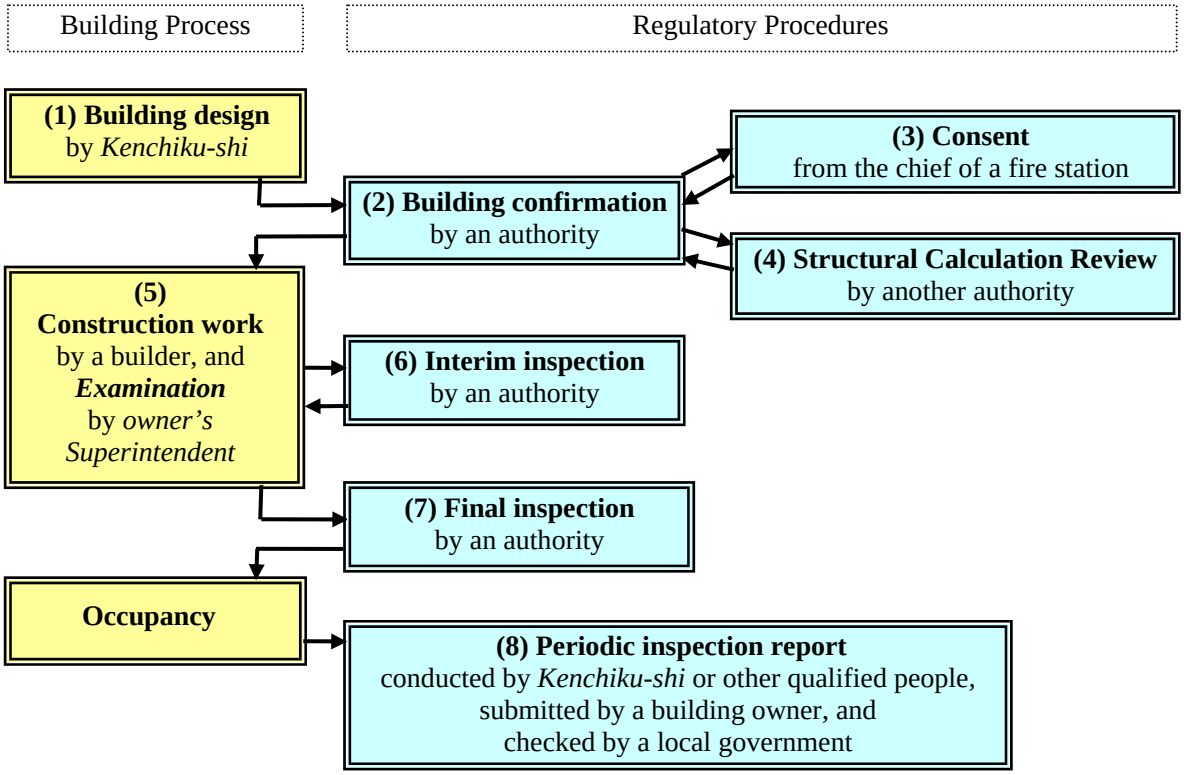
<table>
<tr><th>Building
Area</th><th>(1)
Large buildings (Buildings other than (2))</th><th>(2)
Small buildings, such as detached houses of not more than two stories.</th></tr>
<tr><td>(A) Areas of 218 basic local governments
They are major cities in Japan, and their mayors are Designated Administrative Agencies. Most of them have a population of more than 100,000.</td><td colspan="2">Basic local governments are in charge of building control.</td></tr>
<tr><td>(B) Areas of 176 basic local governments
Most of them are small cities, and their mayors are Designated Administrative Agencies. They are in charge of building control of small buildings only.</td><td>Prefectural governments are in charge of building control.</td><td>Basic local governments are in charge of building control.</td></tr>
<tr><td>(C) Other areas
Area of around 1,400 basic local governments in Japan. Most towns and villages are included.</td><td colspan="2">Prefectural governments are in charge of building control.</td></tr>
</table>

Number of local governments is as of April 2009.

2-3 Regulatory Procedures for Building Construction and Occupancy Stage (including the requirements under the *Kenchiku-shi* Law)

Regulatory procedures for building construction and occupancy stage are as shown in **Figure 3**.

Figure 3 Regulatory Procedures for Building Construction and Occupancy Stage



(1) Building Design

The *Kenchiku-shi* Law stipulates that only *Kenchiku-shi* may perform building design and *owner's superintendence* of building construction, except for small buildings (see **1-9**). The BSL prohibits implementing building construction if its drawings are made in violation of the *Kenchiku-shi* Law.

(2) Building Confirmation

Generally, in cases where a certain building is to be newly constructed, extended, rebuilt or relocated, a building owner must apply for and receive building confirmation from:

- a building official under the *Designated Administrative Agency* in charge of building control in the area; or
- one of the *Designated Confirmation and Inspection Bodies* (see below)

to determine whether the plan of the building is in conformity with technical regulations based on the laws (not limited to the BSL) .

Designated Confirmation and Inspection Body

Designated Confirmation and Inspection Bodies conduct:

(a) building confirmation; and

(b) on-site inspection;

both of these are conducted as a fair and impartial private sector organization. The designation is done by the Minister or prefectural governors. Their works are performed by conformity inspectors who have passed the qualifying examination for *Qualified Building Regulation Conformity Inspectors*. This system was introduced in 1999. On the other hand, building officials under *Designated*

Administrative Agencies are, as mentioned in 2-2(2), also in charge of (a) and (b), above. The effect of the certificate issued by a *Designated Confirmation and Inspection Body* is the same as that of a building official under the *Designated Administrative Agency*. Their achievement is as shown in **Table 5**.

Table 5 ***Designated Administrative Agency*** **and** ***Designated Confirmation and Inspection Body***

	Number of authorities (Sep. 2009)	Number of building confirmations (2008 Japanese fiscal year)
Designated Administrative Agencies	441	172,236 (29 %)
Designated Confirmation and Inspection Bodies	124	412,601 (71%)
Total	565	584,837

(3) Consent (from a chief of a fire station)

Before giving confirmation for buildings, a building official and a *Designated Confirmation and Inspection Body* must obtain consent from:

(a) the chief of the fire station in the respective jurisdiction; or

(b) the fire inspector. (If it is a city, town or village without a fire department, the head).

However, this does not apply in such case that the building requiring confirmation is a detached house, located in areas other than *Fire Protection Zones* or *Quasi Fire-Protection Zones*.

(4) Structural Calculation Review

As mentioned in (2), an application for building confirmation is submitted to:

- a building official under the *Designated Administrative Agency*; or
- one of the *Designated Confirmation and Inspection Bodies*.

In cases where the building is a certain type of building, such as:

- wooden buildings or steel buildings with heights of 13m or more, or eave heights of 9m or more;
- reinforced concrete buildings with heights of 20m or more; or
- others,

a building official and a *Designated Confirmation and Inspection Body* must ask the prefectural governor or one of the *Designated Structural Calculation Review Bodies* (see below) to perform a calculation review on the building plan before issuing a building confirmation.

(Buildings of more than 60m in height (and some others), are exceptions because these buildings need approval from the Minister from the viewpoint of structural safety.)

Designated Structural Calculation Review Body

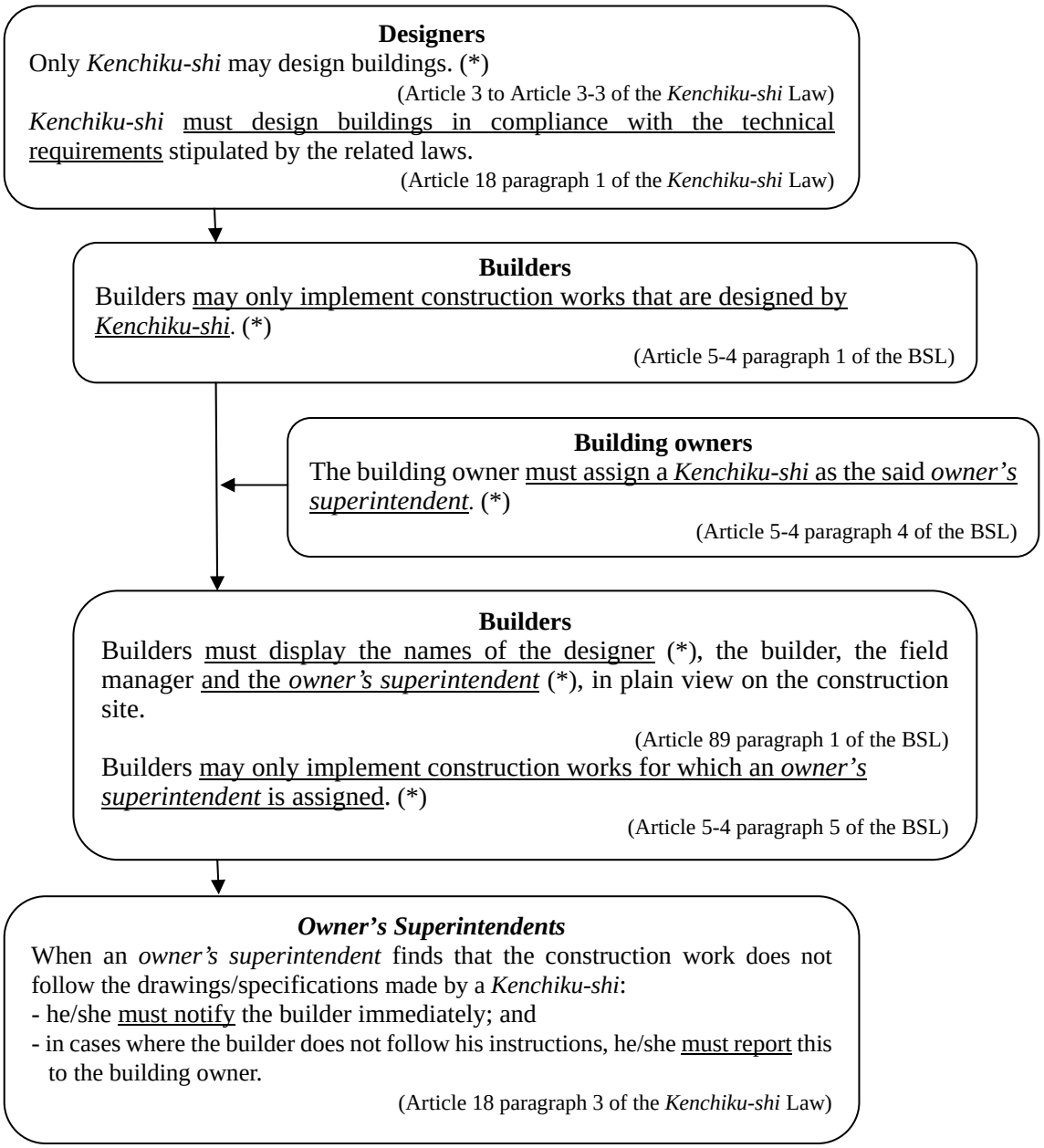
A *Designated Confirmation and Inspection Body* conducts a structural calculation review responding to the request from a building official or a *Designated Confirmation and Inspection Body*. The designation is done by the prefectural governors. This system was introduced in 2007, and 47 bodies have been designated as of August 2008 in Japan.

(5) Construction Work and *Examination*

The BSL and the *Kenchiku-shi* Law stipulate the provisions related to examination by *owners' superintendents* (see **1.9**), as shown in **Figure 4**, so that designers design buildings and builders perform building construction in compliance with the technical requirements stipulated by the BSL.

Figure 4 Provisions related to examination by *owners' superintendents*

Remark: The requirements indicated by (*) do not apply to the construction of small buildings (wooden buildings with not more than two stories and of no more than 100 m^2, and non-wooden buildings with not more than two stories and of no more than 30 m^2).



(6) Interim inspections

A building owner must, in a case where the construction work includes one of the processes in any of (a) and (b) below, and the process has been completed, request within four days from the date of completion, on all such occasions, an inspection by;

- a building official under the *Designated Administrative Agency* in charge of building control in that area; or
- one of the *Designated Confirmation and Inspection Bodies*.

(a) the process of installing second-story reinforcing bars and supporting beams of apartment buildings with three or more stories

(b) processes stipulated by the *Designated Administrative Agency*

(7) Final inspection

Once the construction work has been completed, the building owner must submit a notification to;
- a building official under the *Designated Administrative Agency* in charge of building control in the area; or
- one of the *Designated Confirmation and Inspection Bodies*;

within four days from the date of completion. The building must undergo inspection to ascertain whether the building conforms to the related regulations.

(8) Periodic Report

The owners of the buildings and building equipment that the *Designated Administrative Agency* has designated must have thorough safety checks carried out at regular intervals (designated periods ranging from six months to three years) by *Kenchiku-shi* or other qualified people, and the results must be reported to the *Designated Administrative Agency*. Many *Designated Administrative Agencies* have designated;
- hospitals, hotels, department stores, theaters, apartment houses and offices, that exceeds a specific size; and
- escalators and elevators;

as buildings and building equipment to be reported.

2-4 Measures against Buildings in Violation

In cases where a building is in violation of the BSL, or orders and ordinances based upon it, *Designated Administrative Agencies* are empowered with the measures necessary to issue orders for:
- the suspension of construction work concerned; or
- the demolition, relocation, rebuilding, addition, repair, remodeling, prohibition or restriction of use of the building concerned; or,
- the implementation of other measures to correct violations against the said provisions or requirements;

to the building owner, or to the contractor or field manager of the construction work, or to the owner, custodian or occupant of the building or its site. In order to ensure the observance of the BSL, and orders and ordinances based upon it, various penal provisions are set out.

2-5 Declaration of Dissatisfaction

According to the provisions of the BSL, a request for a review on the proceeding or nonfeasance of:
- a *Designated Administrative Agency*;
- a building official; or
- a *Designated Confirmation and Inspection Body*;

can be made to the *Building Review Council* of the local government concerned. In cases where the *Building Review Council* receives such a request, it is obliged to pass judgment, after a public hearing within one month after the receipt of the request. If there is any dissatisfaction with the judgment of the *Building Review Council*, an appeal against the judgment can be made to the Minister.

Chapter 3 Performance-based Codes

3-1 Principle of *Performance-based Codes*

As part of the 1998 revision of the BSL (enforced in June 2000), performance standards were set up in the Building Codes in order to ensure:

- increased flexibility of performance-based design according to the Building Codes;
- correction of the distorted cost structure; and
- smooth introduction of technical innovations and materials from overseas.

3-2 Structure of *Performance-based Codes*

Major points of the revision are as follows:

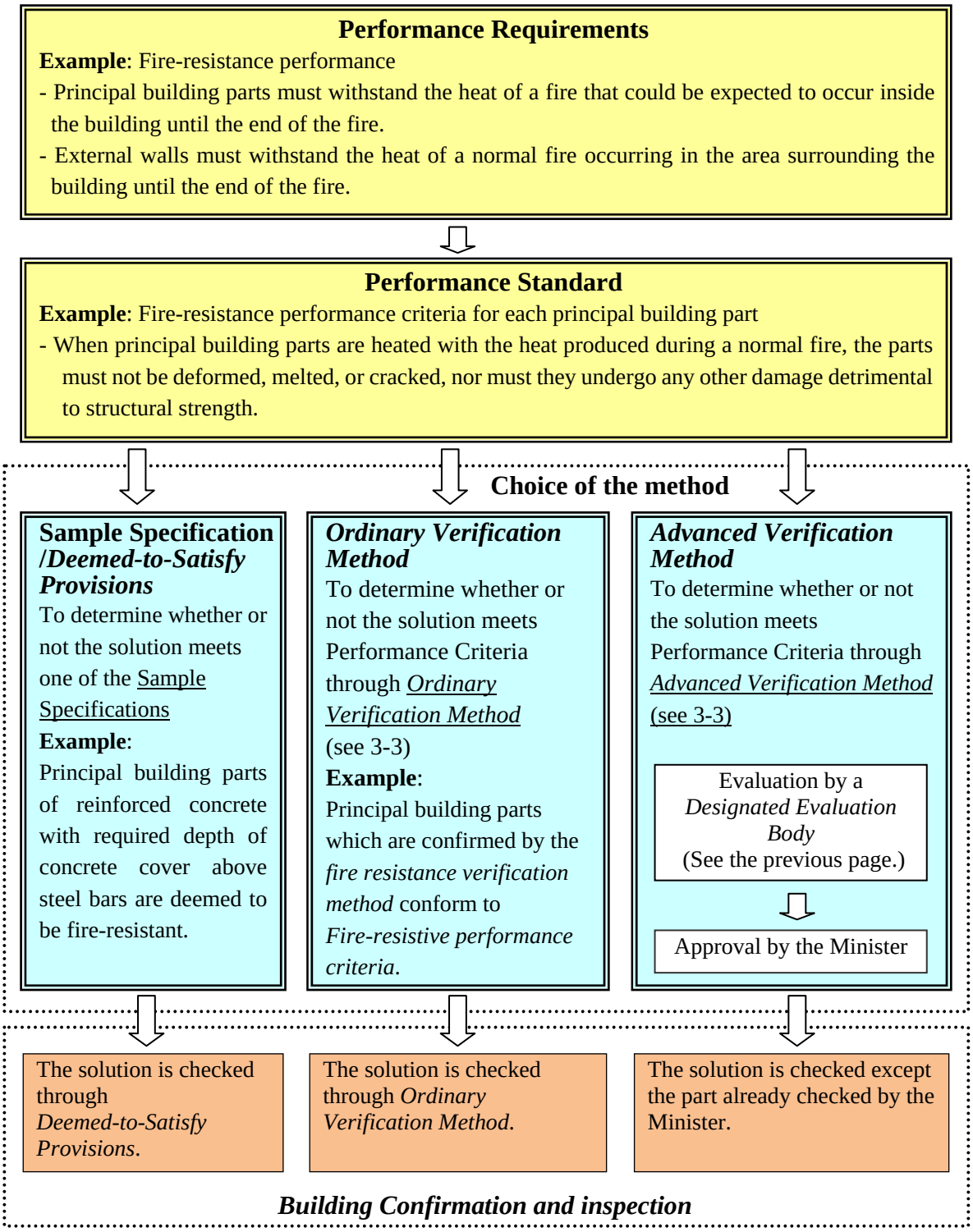
(a) Performance items and performance standards have been clearly specified; and
(b) Test methods to be used for verification have been provided.

The structure of *Performance-based Codes* is as shown in **Figure 5**. The role of *Designated Evaluation Body* mentioned in **Figure 5** is as shown below.

Designated Evaluation Body

Construction methods or building materials, which are not shown in the *Ordinary Verification Methods* or the *Deemed-to-Satisfy Provisions*, must receive an approval by the Minister. A *Designated Evaluation Body* conducts an evaluation to determine whether or not the solution meets *Performance Criteria* through the *Advanced Verification Methods* in response to a request from a building owner. Evaluation by one of the *Designated Evaluation Bodies* is required prior to approval by the Minister. The designation is done by the Minister, and 28 bodies (24 bodies located in Japan and 4 bodies located in foreign countries) have been designated, as of February 2009.

Figure 5 Structure of *Performance-based Codes*



3-3 *Ordinary Verification Methods* and *Advanced Verification Methods*

Details of the *Ordinary Verification Methods* are stipulated in the *Enforcement Order* and in the *MLIT Notifications*. Examples are shown below. On the other hand, details of the *Advanced Verification Methods* are not issued by the Government. *Designated Evaluation Bodies* evaluate the design/solution of a building, using a manual approved by the Minister, then the applicant sends the evaluation body decision, along with drawings, to the Minister to request approval.

(1) *Fire-resistance Verification Method*

The *Fire-resistance Verification Method* is a method based on technical standards, etc. provided in the *Enforcement Order* and in the *MLIT Notifications*, which is used to assume the occurrence of a fire in a room, and to verify that principal building parts can withstand the heat from the fire until the end of the fire. When fire-resistance is verified through this method, deemed-to-satisfy solutions for fire-resistance are not applied to the solution. The stages are as follows:

(a) Calculation of fire duration;

The predicted time from the start of a fire until its end is calculated, considering the volume of combustible materials, the size of openings, etc.

(b) Calculation of heat-withstanding periods for principal building parts;

The periods over which principal building parts can withstand the heat by the fire are calculated, taking into consideration the type of structural methods used in the principal building parts, the heat of a fires, etc.

(c) Comparison of (a) and (b);

(b), heat withstanding period, must be longer than (a), fire duration.

(2) *Verification Method for Evacuation Safety*

The *Verification Method for Evacuation Safety* is a method based on technical standards, etc. provided in the *Enforcement Order* and in the *MLIT Notifications*, which is used to check evacuation safety in fires by comparing:

(i) the predicted time required for the evacuation of persons in a building; with

(ii) the time during which the floors, or building, will be at risk from smoke and gas, etc,

according to the design of the building (number of persons present, location of evacuation routes, fire and smoke prevention methods, etc.). When evacuation safety is verified through this method, some *Deemed-to-Satisfy Provisions* for evacuation safety are not applied to the solution. The stages are as follows:

(a) Calculation of time until completion of evacuation;

The evacuation time is calculated as a sum of:

(i) the time from the outbreak of fire until the start of evacuation;

(ii) the walking time to the exits; and

(iii) the time lost at exits.

(b) Calculation of time required for smoke and gas to become a hazard;

The time is calculated for fire-related smoke and gas to descend from ceilings to reach a level at which they become hazards to evacuation, taking into account such factors as:

(i) the floor area and ceiling height;

(ii) the smoke exhaust assembly; and

(iii) the types of materials used to finish the ceilings and walls.

(c) Comparison of (a) and (b);

(a), the time until completion of evacuation, must be shorter than (b), the time when smoke/gas becomes a hazard.

3-4 *Type Approval* and *Certification of Specific-type Product Manufacturers*

At the same time that the performance standards were added to the Building Codes, new systems of *Type Approval* and *Certification of Specific-type Product Manufacturers* were also created to decrease the burden on applicants and to improve the practicality of the examination process.

(1) *Type Approval*

For example, many prefabricated houses share many of the same design features, and many buildings have much of the same type of equipment, such as mass-produced elevators and water treatment facilities. It is not practical to check these products in every building. Therefore, the BSL stipulates that the Minister designates *Approval Bodies*, and that they:

(a) examine a building, a part of a building, or an element/component of a building to determine whether they meet the respective part of the Building Codes; then

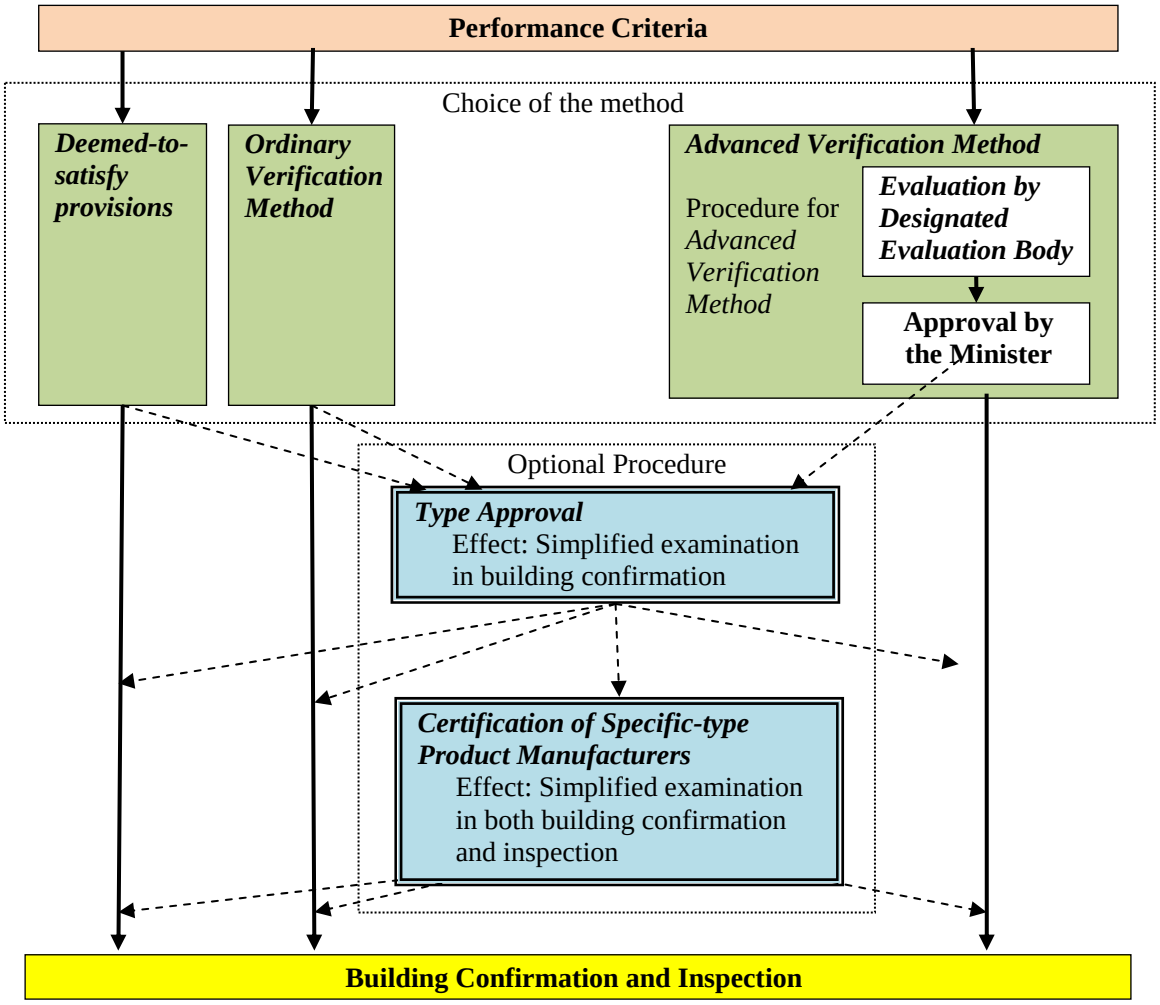
(b) issue a *Type Approval* prior to the examination by building confirmation agencies.

If *Type approval* is issued, examination for building confirmation of every building is simplified because not every building requires examination for every part of the Building Codes. The number of *Designated Approval Bodies* is 8, as of February 2009.

(2) *Certification of Specific-type Product Manufacturers*

In addition, *Designated Approval Bodies* are allowed to grant *Certification of Specific-type Product Manufacturers* to manufacturers who supply the above mentioned products with the *Type Approval*, through good quality management. In this case, not only examinations for building confirmation, but also on-site inspection of each building are simplified.

Figure 6 ***Type Approval*** **and** ***Certification of Specific-type Product Manufacturers***



Chapter 4 Building Codes for Structural Safety

4-1 General

In the BSL, the basic idea concerning structural safety is that structures must be safe against loads and external forces, such as snow loads, wind pressure, and seismic forces. This is to ensure that:

(a) structures remain undamaged during and after normally predictable phenomena, such as snowfall in cold regions and small-magnitude earthquakes; and

(b) they are not destroyed, even in big earthquakes, typhoons, and other disasters.

In order to ensure the structural safety of buildings, the BSL and related documents provide:

(i) requirements concerning the safety of sites;

(ii) restrictions on the types of structures of large buildings;

(iii) requirements on quality and safety of structural members, etc (see **4-2**);

(iv) requirements on structural methods, according to the structural type (see **4-3**); and

(v) requirements on the structural calculations (see **4-4**) in order to confirm the structural safety of large buildings. The range of buildings for which structural calculations must be made is shown in **Table 6** below.

Table 6 Buildings that Require Structural Calculations

Structural type	Scale
Wooden Structure	(a) Buildings with 3 or more stories
	(b) Buildings with a total floor area of more than 500 m^2
	(c) Buildings exceeding 13 m in height or 9 m in eave height
Others	(a) Buildings with 2 or more stories
	(b) Buildings with a total floor area of more than 200 m^2

4-2 Quality and Safety of Structural Members, etc

When building materials designated by the Minister (such as concrete, steel, and seismic isolation devices) are used for major building parts (such as foundations, columns, bearing walls, and fire doors),

(1) these materials must conform to either *Japanese Industrial Standard* (JIS) or *Japanese Agricultural Standard* (JAS), as specified by the Minister;

(2) otherwise they must be approved by the Minister.

In the case of (2), before application for ministerial approval, it is mandatory to have performance evaluations conducted by *Designated Evaluation Bodies* based on the technical criteria concerning the respective materials, which are provided by the *MLIT Notification*.

There are also provisions for structural safety concerning:

- durability of structural members;
- foundations;
- roofing materials;
- water tanks on roofs; and
- others.

4-3 Structural Method

The Enforcement Order provides for technical standards according to ordinary structural types, namely:

- wooden structures;
- masonry structures;
- reinforced concrete block structures;

- steel structures;
- reinforced concrete structures;
- steel and reinforced concrete composite structures; and
- plain concrete structures.

In addition, technical standards for other structural types are established and announced in the form of *MLIT Notifications*.

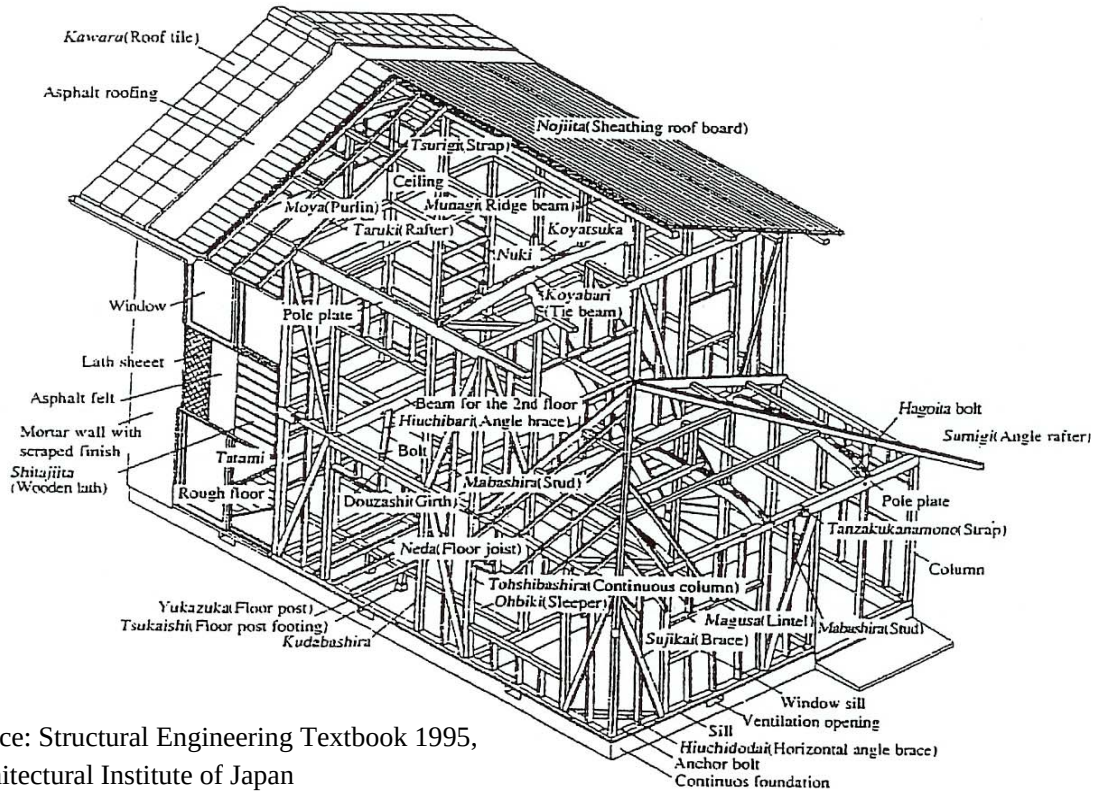
(1) Wooden Structure

Concerning wooden structures, regulations are prescribed for:

- structure of sills and foundations;
- size of posts;
- necessary strength and quantity of braces and structural frames;
- methods of using joints/connection;
- quality of preservative measures; and
- others.

Here, the wooden structure refers to the post and beam structure, which is the conventional method of construction in Japan (see **Figure 7**), while the wood-frame structure comes under a different set of technical standards (see **(8)**). Technical standards also exist for large wooden structures with posts and beams with large sectional size.

Figure 7 Structure of Traditional JapaneseWooden Houses



Source: Structural Engineering Textbook 1995, Architectural Institute of Japan

(2) Masonry Structure

Concerning masonry structures, such as the brick structure and the stone structure, regulations are prescribed for:

- foundation structures;

- necessary length and thickness of walls;
- wall-girder structures;
- limitations on the size of openings;
- methods of construction work; and
- others.

(3) Reinforced Concrete Block Structure

This method of construction involves reinforcing bars passing through concrete blocks. Various regulations are provided for:

- foundation structures;
- necessary length and thickness of walls;
- size and arrangement of reinforcing bars;
- wall-girder structures;
- method of construction work;
- structural parts of fences; and
- others.

(4) Steel Structure

Regulations concerning the steel structure are provided for:

- effective slenderness ratio of members;
- foundation structures;
- methods of making joints and connections; and
- others.

(5) Reinforced Concrete Structure

Reinforced concrete structures are governed by regulations prescribing:

- quality of concrete materials;
- connections and arrangement of reinforcing bars;
- strength of concrete;
- method of curing;
- structure of columns, floor slabs, beams, and bearing walls;
- depth of concrete cover above steel bars; and
- others.

(6) Steel and Reinforced Concrete Composite Structure

Concerning steel and reinforced concrete composite structures, regulations for both steel structures and reinforced concrete structures are applied correspondingly, as the occasion demands.

(7) Plain Concrete Structure

Concerning plain concrete structures, regulations for both reinforced concrete structures and masonry structures are applied correspondingly, as the occasion demands.

(8) Other Structural Types

Technical standards for structural types other than those listed above are announced in the *MLIT Notifications*. Some of the technical standards have been announced for:

- wood-frame structures;

- pre-stressed concrete structures;
- box-frame type reinforced concrete structures; and
- others.

4-4 Structural Calculations

The *Enforcement Order* prescribes the loads, external forces, allowable unit stresses, and material strength, which are necessary for structural calculation. It also prescribes various structural calculation methods in accordance with the height and structure of buildings. As for safety from earthquakes, the BSL requires buildings to satisfy both performances, as shown in **Table 7**.

Table 7 Required Performances against earthquakes

	Assumed earthquakes	Required performances
(1)	Small seismic forces, which might occur several times during the life of the building	Building structure remains undamaged during and after an earthquake.
(2)	Large seismic forces, which might occur on very rare occasions during the life of the building	Building structures is not destroyed and will not endanger people's lives.

(1) Loads and External Forces

Loads and external forces as factors for structural calculation vary, depending upon the location of the building and its use. Of these forces, at least five must be checked. They are:
- permanent load (dead load);
- imposed load (live load);
- snow load;
- wind pressure; and
- seismic force.

Depending upon the conditions, checks must also be performed for other external forces such as:
- ground pressure;
- water pressure;
- vibration; and
- shock.

(a) Permanent load (Dead load)

The permanent load is the load of each of the components of the building, including building equipment. It depends on the structural type of the building, finishing material of the components, etc. Various values are provided in the *Enforcement Order* for general cases. For special cases, the permanent load is determined according to the actual conditions.

(b) Imposed load (Live load)

The imposed load is the load of furniture, occupants, etc. It depends on the use of the building. Various values are provided in the *Enforcement Order* for general cases. For special cases, the imposed load is determined according to the actual conditions.

(c) Snow load

The snow load is determined by the method of calculation, below. Snow accumulation varies greatly from region to region in Japan because of the various meteorological conditions. Therefore, the *Designated Administrative Agencies* issue regulations to specify values, based on criteria specified by MLIT.

$S = H \cdot R$

S: Snow Load (N/m^2)

H: Deepest snow fall in the region (cm), which is specified by regulation, issued by the *Designated Administrative Agency*

R: Unit snow load, which is 20 N/m^2/cm, or the value specified by regulation, issued by the *Designated Administrative Agency*

The snow load used in calculations, however, can be decreased by increasing the degree of the roof slope. It can also be decreased in regions where snow is customarily removed from roofs.

(d) Wind pressure

The wind pressure that acts on a building depends on the shape and the height of the building. It is calculated by the velocity pressure multiplied by the wind force coefficient. The velocity pressure is generally calculated by the following formula:

$q = 0.6\ E\ Vo^2$

q: Velocity pressure (N/m^2)

E: Coefficient calculated using a method stipulated by the Minister, reflecting the roof height of the building and its surrounding environment

Vo: Standard wind velocity (m/s), as determined by the Minister

Wind force coefficients that are available for general cases are specified in the *MLIT Notification*.

(e) Seismic force

The seismic force is determined by calculating the inertial force that is generated through the movement of both the ground and the building. That is, horizontal force (seismic shear force) generated in the building. It is calculated by Formula A and Formula B below, incorporating the vibration characteristics of the building, the conditions of the ground, and other conditions.

Formula A: For seismic Force above the ground level

$Qi=Wi \cdot Ci$

$Ci=Z \cdot Rt \cdot Ai \cdot Co$

Qi: the seismic shear force of point "i" (the height from ground level)

Ci: the seismic shear coefficient of point "i"

Wi: permanent load added to imposed load above point "i" (+ snow load, in heavy snow areas, as designated by the *Designated Administrative Agency*)

Z: the seismic zone factor (from 0.7 to 1.0)

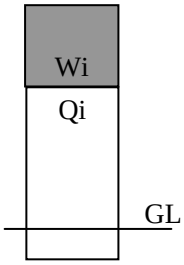
Rt: vibration characteristic factor

Ai: vertical distribution factor

Co: the standard shear coefficient

(a) In general cases, not less than 0.2 (not less than 0.3 within areas designated as soft ground areas)

(b) For calculating *required horizontal load-carrying capacity*, not less than 1.0



Formula B: For seismic force of the below-ground portion

$Qb=Wb \cdot k$

Qb: the seismic shear force

k: the seismic coefficient

$k \geq 0.1\ (1-H/40)\ z$

H = the depth of the portion below ground level (m) ($H \leq 20$)

z = the seismic zone factor (from 0.7 to 1.0)

Wb: permanent load added to imposed load above the portion

(2) Allowable unit stress and Material strength

Values of allowable unit stress are available for common materials, such as timber, steel, concrete, etc. These values are specified for both:

(a) sustained loads (see **Table 8** below); and,

(b) temporary loads (see **Table 8** below).

Values of material strength are available for use in *horizontal load-carrying capacity calculation* (see **(d)** in **Table 10**).

Table 8 Sustained loads and Temporary loads

Load type	Possible conditions	Loads and external forces, which must be included
Sustained loads	Normal time	G+P
Temporary loads	Snow	G+P+S
	Storm	G+P+W
	Earthquake	G+P+K

In this table, *G*, *P*, *S*, *W* and *K* represent the following loads and forces:

G: Permanent load

P: Imposed load

S: Snow load

W: Wind load

K: Seismic force

<Exception> Buildings in heavy snow areas designated by the *Designated Administrative Agency*

(3) Method of Structural Calculation

The BSL provides:

- requirements on structural methods (see **4-3**); and
- various structural calculation methods for structural safety (see **(a)** to **(f)** in **Table 10**),

and stipulates some combinations of these methods (see **A** to **F** in **Table 10**). Every building must be confirmed its structural safety though one of the combinations. Any types of combinations can be used for small buildings, but for all other buildings, the possible combinations are limited based on the structural type, height, and size of the building (see **Table 9**).

There are 6 combinations (**A** through **F**). The order of sophistication of the combinations is from **F** (the highest), down to **A**. Some requirements on structural methods are not applied to the building solutions for which structural safety is confirmed through either **D**, **E**, or **F**, because they are very sophisticated, and they are performance-based calculation methods.

Table 9 Possible Combinations of Structural Calculation Methods, etc.

Structure, height, and size of building		Possible combinations of **Table 10**
(I) Small buildings	Wooden buildings that conform to the following criteria: - number of stories ≦2; - total floor area ≦500 m^2; - building height ≦13m; - eave height ≦9 m. Others - single-story buildings with floor area ≦200 m^2	**A** to **F**
(II) Medium-sized buildings	Buildings other than (I), (III) and (IV)	**B** to **F**
(III) Large-sized buildings	Any of the buildings below, unless they are more than 60m in height: - Wooden buildings that are more than 13m in height and that have eaves of more than 9m in height; - S buildings with 4 or more stories (excluding basement); - RC or SRC buildings of 20m or more in height.	**C** to **F**
	Building height ＞ 31m	**D** to **F**
(IV) High-rise buildings	Building height ＞ 60m	**F**

Table 10 Structural calculation methods, etc.

Remarks: The methods indicated by "○" are included in the combination of methods.

Structural calculation methods, etc.	Combinations of methods					
	A	**B**	**C**	**D**	**E**	**F**
(a) Requirements on structural methods (see **4-3**) Requirements on structural methods are general regulations stipulating details of structural methods according to the structural type.	○	○	○	○ *1	○ *2	○ *2
(b) *Allowable stress calculation + Structural calculation for roofing material, etc.*		○	○	○		
(c-1) *Calculation for story-drift angle*			○	○		
(c-2) *Calculation for stiffness ratio + Calculation for eccentricity ratio + Aspect ratio*, etc.			○			
(d) *Horizontal load-carrying capacity calculation*				○		
(e) *Response and Limit capacity calculation* or structural calculations methods stipulated by the Minister					○	
(f) *Time-series analysis*						○

*1 Some requirements on structural methods are not applied to the building solutions for which structural safety is confirmed through combination **D** of structural calculation methods.

*2 Only provisions concerning durability, etc. are applied to the building solutions of which structural safety is confirmed through the combinations **E** or **F** of structural calculation methods.

Chapter 5 Building Codes for Fire Safety

5-1 The BSL and the Fire Service Law

In Japan, the BSL and the Fire Service Law provide various technical requirements to secure fire safety in buildings, as mentioned in **1-4**. The purpose of each of the BSL and the Fire Service Law items in **Table 11**, below, is stated in the left column. A detailed explanation of each of the BSL items is included in this document, but explanations for the Fire Service Law items are not included.

Table 11 Comparison of the BSL and the Fire Service Law

Purpose	**Examples of technical requirements**	
	The BSL (Regulates the basic structure and facilities of buildings)	**The Fire Service Law** (Regulates facilities and equipment from a fire safety viewpoint)
Prevention of the spread of fire from adjacent buildings	- Fire-resistance of roofing materials - Fire-resistance of external walls	
Prevention of outbreak of fire	- Fire-resistance of interior finishing materials	- Flame retardant curtains - Restrictions on appliances that operate with a flame
Fire detection		- Fire alarms
Evacuation	- Evacuation facilities, such as escape stairs - Smoke control systems	- Escape facilities, such as escape ladders
Fire extinguishment and rescue	- Emergency elevators - Rescue access	- Fire extinguishing equipment, such as automatic sprinkler systems and standpipe systems
Prevention of spread of fire within a building	- Fire compartments	
Prevention of structural collapse	- Fire-resistance of principal building parts	

5-2 Definitions

Definitions related to fire safety in the BSL are as below.

(1) ***Noncombustible materials*** (hereafter referred to as **NC**);
(2) ***Quas- noncombustible materials*** (hereafter referred to as **Q-NC**); and
(3) ***Fire retardant materials*** (hereafter referred to as **FR**);
are building materials that conform to requirement (*1) during the time range shown in **Table 5-2**, and that are either stipulated in the MLIT Notifications or that have been approved by the Minister on an individual basis.

(*1) Requirement for NC, Q-NC, and FR

When being heated with the heat of a normal fire, the material must satisfy the essential conditions in the following items (for those used as external finishing of the building, (a) and (b)) for the time as shown in **Table 12** after the beginning of the heating:

(a) It must not cause burning.

(b) It must not cause deformation, melting, cracking, or other damage detrimental to fire prevention.

(c) It must not generate smoke or gas that is detrimental to evacuation.

Table 12 NC, Q-NC, and FR

Material	Duration after heat is applied	Examples
(1) NC	20 minutes	- Concrete, Mortar, and Lime plaster; - Bricks; - Pottery tile and Ceramic tile; - Steel and Aluminum; - Glass; and - Gypsum board with a thickness of 12 mm or more, and with a paper covering of a thickness of 0.6 mm or less
(2) Q-NC	10 minutes	- NC; - Gypsum board with a thickness of 9 mm or more, and with a paper covering of a thickness of 0.6 mm or less; and - Wood wool cement board with thickness of 15 mm or more
(3) FR	5 minutes	- NC and Q-NC; and - Gypsum board with a thickness of 7 mm or more, and with a paper covering of a thickness of 0.5 mm or less

(4) ***Parts liable to catch fire*** are parts of a building within a distance of 3 m for the first floor, or 5 m for the second or higher floors, from any of the following:

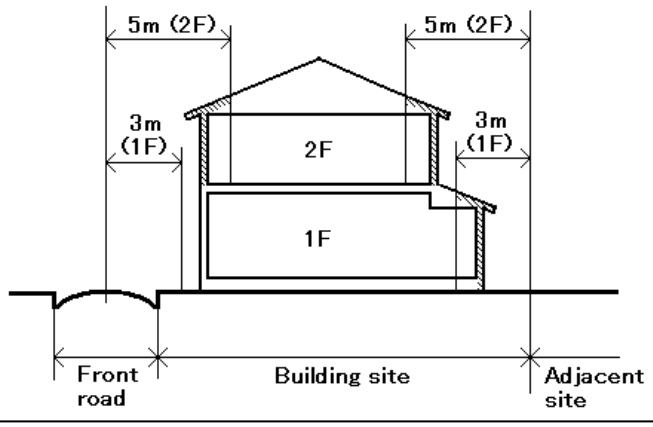
(a) the boundary line with the adjacent land lot;

(b) the center line of the road;

(c) the center line between exterior walls of two or more buildings on the same site (two or more buildings with an aggregate total floor area not exceeding 500 m^2 are regarded as one building). (see **Figure 8**)

However, any part facing an open space or a water area that is effective for fire safety, such as a park, public square, river, or facing walls of fire-resistive construction, or the like, are not considered *parts liable to catch fire*.

Figure 8 ***Parts Liable to Catch Fire***



(5) ***Fire-resistive buildings*** are defined as buildings:

(a) of which *principal building parts* (namely, those walls, posts, beams, roofs, and stairways that are important from the viewpoint of fire prevention):

(i) come under *fire-resistive construction*; or

(ii) are constructed using a solution that has been confirmed to be capable of withstanding fire and heat until the end of a fire through:

- *Fire-resistance Verification Method* (see **3-3 (1)**); or
- Approval from the Minister; and

(b) of which openings in *parts liable to catch fire* are equipped with certain *fire-preventive assemblies*.

Examples are:

(a) reinforced concrete structure with required depth of concrete cover above steel bars; and

(b) steel structure with necessary fire-preventive covering.

(6) ***Quasi fire-resistive buildings*** are defined as buildings:

(a) of which *principal building parts*:

(i) come under *quasi fire-resistive construction* (see **Figure 9**); or

(ii) are constructed using a construction method specified in the *MLIT Notification* (see **Figures 10 and 11**); or

(iii) are constructed through a solution approved by the Minister; and

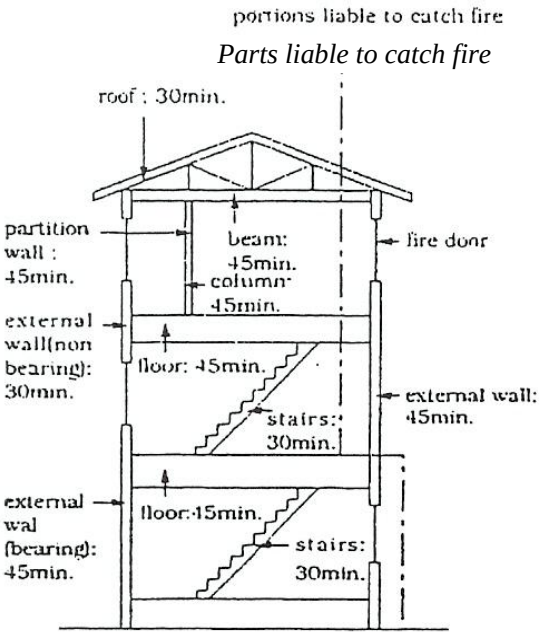
(b) of which openings in *parts liable to catch fire* are equipped with certain *fire-preventive assemblies*.

The definition of *quasi fire-resistive buildings* does not include *fire-resistive buildings*.

(7) ***Fire-Protection Zone*** **and** ***Quasi Fire-Protection Zone*** are zoning systems provided by the City Planning Law. These zones are designated in urban areas in order to prevent the spread of fire from building to building. In the major cities of Japan, these zones are designated over a large area.

Extensive measures for fire safety are required in the designated zones by the BSL.

Figure 9 ***Quasi fire-resistive building*** **(Type A)**



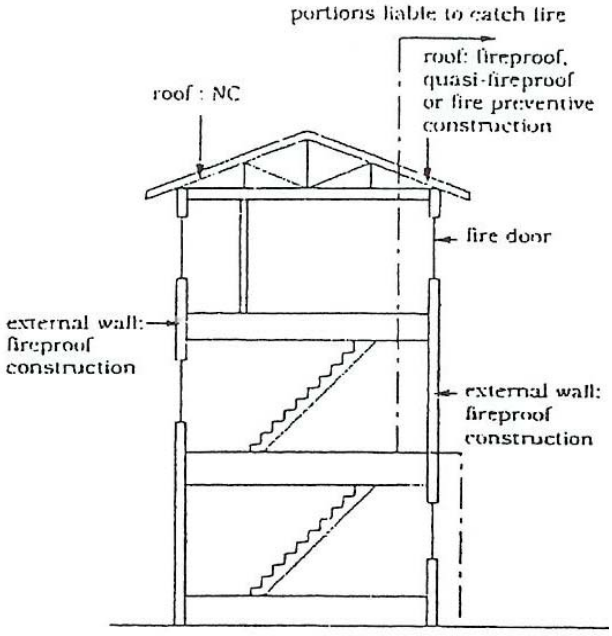
Remarks:

NC: *Noncombustible material*

Q-NC: *Quasi-noncombustible material*

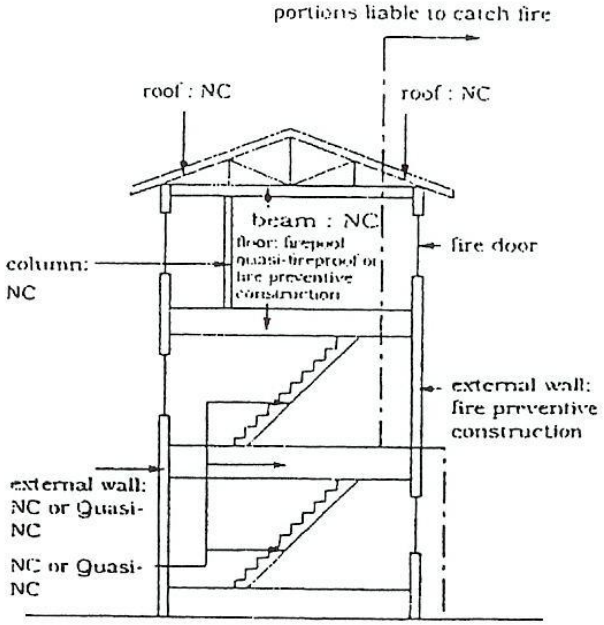
Time shown in the figures indicates the duration of time for which components of quasi fire-resistive buildings must be able to withstand fire.

Figure 10 ***Quasi fire-resistive building***



(Type B-2)

Figure 11 ***Quasi fire-resistive building***



(Type B-1)

5-3 Restrictions on Construction of *Special Buildings*

Special buildings are defined as, but not limited to:

(a) buildings that are intended to be used by many and unspecified people, such as theaters, grandstands and department stores; and

(b) as buildings where many people sleep, such as apartment houses, hotels and hospitals.

It is prescribed that certain sizes of these *special buildings* must be *fire-resistive building*s, and other certain sizes of these *special buildin*gs must be either *fire-resistive buildings* or *quasi fire-resistive buildings*. (see **Table 13**)

Table 13 *Special Buildings* which must be Fire-resistive Buildings or Quasi Fire-resistive Buildings

Use		Grade of building required		
		Fire-resistive building (in case of (1) or (2))		*Fire-resistive building or Quasi fire-resistive building*
		(1) Location of the floor of use	(2) Floor areas	Floor areas
1	Theaters, Movie theaters, Entertainment halls	The main floor is not on the 1st floor.	Seating space is 200 m^2 or more. (In case of open-air stand, 1,000 m^2)	-
	Grandstands, Public halls, Assembly halls,	The third or higher floors		
2	Hospitals, Clinics (limited to those having patient accommodation facilities), Hotels/inns, Boarding houses, Apartment houses, Dormitories, *Welfare facilities*(*1)	The third floor or higher (*2)	-	Floor area for the use on the 2nd floor is 300 m^2 or more. (For hospitals, this only applies to buildings which have patient accommodation facilities on the 2nd floor.)
3	Schools, Gymnasia, Museums, Art museums, Libraries, Bowling alleys, Indoor ski slopes, Skating rinks, Swimming pools, Sports practice facilities	The third floor or higher	-	Total floor areas for the use is 2,000 m^2 or more.
4	Department stores, Markets, Exhibition halls, Cabarets, Cafes, Night clubs, Bars, Dance halls, Amusement halls, Public bathhouses, *Machiai*, Restaurants, Dining facilities, Stores engaged in commodity sales (excluding those with a floor area of 10 m^2 or less)	The third floor or higher	Total floor areas for the use is 3,000 m^2 or more.	Floor area for the use on the 2nd floor is 500 m^2 or more.
5	Warehouses	-	Total floor areas for the use on the 3rd floor or higher is 200 m^2 or more.	Total floor areas for the use is 1,500 m^2 or more.
6	Automobile garages, Automobile repair shops, Movie studio, Television studio	The third floor or higher	-	Total floor areas for the use is 150 m^2 or more.

7	Storage or treatment facilities for hazardous materials of more than a specified value	-	-	All cases

(* 1) *Welfare facilities* include:
- childrens' welfare facilities;
- maternity clinics;
- rehabilitation facilities for physically disabled persons (excluding prosthetic appliances manufacturing facilities and information centers for the visually/hearing impaired);
- social rehabilitation facilities for mentally disordered persons;
- protective institutions (excluding medical protective institutions);
- protective facilities for women;
- facilities for people with intellectual disabilities;
- welfare facilities for the elderly;
- fee charging homes for the elderly; and
- maternal and child health facilities.

(* 2) Three-story apartment houses can be of *quasi fire-resistive construction* when all of the following conditions exist:
- the area is not in a Fire Protection Zone;
- the structure has 1-hour or more *quasi fire-resistive performance*; and
- all other necessary measures are implemented from the viewpoint of fire prevention.

5-4 Restrictions on buildings in *Fire Protection Zones* and *Quasi Fire-Protection Zones*

Buildings in *Fire Protection Zones* or *Quasi Fire-Protection Zones* must follow the requirements as shown in **Table 14**.

Table 14 Restrictions on buildings in *Fire Protection Zone* and *Quasi Fire-Protection Zone*
Small annexed buildings, etc. are exceptions.

Zones	Buildings		Requirements
	F: Total floor area	N: Number of stories(*1)	
Fire Protection Zones	$F > 100m^2$	$N \geqq 1$	*Fire-resistive building*
	$F \leqq 100m^2$	$N \geqq 3$	
		$N \leqq 2$	*Fire resistive building*; or *Quasi fire-resistive building*
Quasi Fire-Protection Zones	$F > 1{,}500m^2$	$N \geqq 1$	*Fire-resistive building*
	$1{,}500m^2 \geqq F > 500m^2$	$N \geqq 4$	
		$N \leqq 3$	*Fire-resistive building*; or *Quasi fire-resistive building*
	$F \leqq 500m^2$	$N = 3$	*Fire-resistive building*; *Quasi fire-resistive building*; or Specific wood building

(*1) Basements are excluded from the number of stories in the case of *Quasi Fire-Protection Zones.*

If buildings are located in either *Fire Protection Zones* or *Quasi Fire-Protection Zones*, openings located in *parts liable to catch fire* must be fitted with certain *fire-preventive assemblies*.

5-5 Fire Compartments

Fire-resistive buildings, etc. must be separated into fire compartments with, but not limited to:
(a) floors or walls of *fire-resistive construction*, etc.; and
(b) fire doors.

These fire compartments have the following categories.

(1) Area separations

Area separations are arranged to prevent the horizontal spread of fire within a building. They have walls and floors of *fire-resistive construction*, fire doors, and so on. (see **Table 15**)
In addition, wooden buildings with a floor area of more than 1,000 m^2 must be effectively divided with fire walls into areas of no more than 1,000 m^2, unless they are *fire-resistive buildings* or *quasi fire-resistive buildings*.

Table 15 Area Separation

Buildings/parts of buildings		Maximum allowable floor area of each fire compartment (*4)	Methods of separation
1 Buildings whose principal building parts are of *fire-resistive construction* (*1)		1,500 m^2	Floors and walls: *1-hour quasi fire-resistive construction* (defined in Article 115-2-2 paragraph 1 item (1) of the *Enforcement Order*) Openings: *Specified fire-preventive assembly* (defined in Article 112 paragraph 1 of the *Enforcement Order*) Partition walls: Fire-resistive treatment must be provided as specified to partition walls in the key locations of those buildings listed in cell no. 2.
Quasi fire-resistive buildings	2 - Buildings regulated by the Article 2 item (9-3)(a) of the BSL (*2) - Buildings regulated by the Article 109-3 item (1) of the *Enforcement Order* (fire-resistive external walls type) (*2)	500 m^2	
	3 - Buildings regulated by Article 115-2-2 paragraph 1 item (1) of the Enforcement Order (*1-hour quasi fire-resistive type*) (*2) - Buildings regulated by Article 109-3 item (2) of the *Enforcement Order* (NC type) (*2)	1,000 m^2	
	4 Not regulated by law	1,500 m^2	
11th floor, or higher	5 Interior finish and base lined with NC (*3)	500 m^2	Floors and walls: *Fire-resistive construction* Openings: *Specified fire-preventive assembly*
	6 Interior finish and base lined with Q-NC (*3)	200 m^2	
	7 Other than 5 and 6 (*3)	100 m^2	Floors and walls: Fire-resistive construction Openings: *Fire-preventive assembly* as stipulated in Article 2 Item (9-2) (b) of the BSL

Exceptions:

*1 - Seating space in theaters, movie theaters, entertainment halls, grandstands, public halls, assembly halls, and space for gymnasia, factories, etc.
- Staircases, hoistways (elevator shafts) including passenger lobbies partitioned to constitute fire compartments.

*2 - Space for gymnasia, factories, etc. with NC or Q-NC for interior finishes.
- Staircases or hoistways (elevator shafts) including passenger lobbies with NC or Q-NC for interior finishes partitioned to constitute fire compartments.

*3 - Staircases and hoistways (elevator shafts) including passenger lobbies, corridors or other evacuation spaces, or housing units in apartment houses not exceeding 200m^2, where these are partitioned to provide fire compartments.

Other:

*4 - In cases where automatic fire extinguishing equipment (such as sprinklers) is provided, the maximum allowable floor area of each fire compartment can be doubled.

(2) Shaft enclosures

Vertical spaces, such as staircases, hoistways (elevator shafts), pipe spaces, wellholes, etc. that pass through two stories or more, must be, in principle, separated from other spaces with:

(a) floors or walls of *quasi fire-resistive construction*; or

(b) *fire-preventive assemblies* as stipulated in Article 2 Item (9-2) (b) of the BSL.

(3) Mixed-use separations

In *special buildings* (see **5-3**) of complex uses, parts of different use categories must be separated from each other with:

(a) floors or walls of *1-hour quasi fire-resistive construction*; or

(b) *specified fire-preventive assemblies* defined in Article 112 paragraph 1 of the *Enforcement Order*.

5-6 Restrictions on External Finishing

In order to prevent buildings from catching fire, restrictions are placed on external finishes for roofs, soffits, external walls, and openings.

(1) Fire prevention restrictions for roofs

For buildings which:

(a) have a total floor area in excess of 1000m^2 ; or

(b) are located in certain areas (*Fire Protection Zones*, *Quasi Fire-Protection Zones*, or zones designated by *Designated Administrative Agencies*, based on Article 22 of the BSL),

roofs must be made in such a way that they do not catch fire, melt, or undergo splitting, etc. from sparks caused by fires.

(2) Restrictions for external walls and soffits located in *parts liable to catch fire*

External walls and soffits of wooden buildings located in *parts liable to catch fire* must be of *fire-preventive* or *quasi fire-preventive construction*, for example, walls that are finished with mortar or laminated with gypsum board, in accordance with:

- the use of the building;
- the total floor area; and
- the zone in which it is located.

(see **Table 16**)

Table 16 Fire-Preventive Construction of *Parts Liable to Catch Fire* on the External Walls and Soffits

Structural type	Areas	Building type	Parts	Construction
Wooden buildings	In *Quasi Fire-Protection Zones*	All buildings	External walls and soffits in *parts liable to catch fire*	*Fire-preventive construction*
	in the areas based on the article 22 of the BSL	1 Schools, theaters, movie theaters, entertainment halls, grandstands, public halls, assembly halls, markets, or public bathhouses 2 Automobile garages (only applied in cases where aggregate of floor areas for the said use exceeds 50 m^2) 3 Department stores, apartment houses, dormitories, hospitals, or warehouses (only applied in cases where the number of stories is two and the total floor area for the said use exceeds 200m^2)	External walls and soffits in *parts liable to catch fire*	*Fire-preventive construction*
		4 Other uses	External walls in *parts liable to catch fire*	Structure satisfying *quasi fire-preventive performance*
	All areas	Buildings whose total floor area (aggregate of total floor areas in case of 2 or more wooden buildings on the same site) is more than 1,000 m^2	External walls and soffits in *parts liable to catch fire*	*Fire-preventive construction*

Remarks:
If a building stands in two (or more) of the above zones, the stricter (or strictest) provisions of the restrictions in the zones are applied to the whole building.

5-7 Restrictions on Interior Finishes

Finishing materials for ceilings and walls of the buildings are restricted in accordance with their:
- use;
- scale;
- construction types; and
- etc.

for the purpose of retarding the initial growth of fire, ensuring safe evacuation in the initial stage of fire, (for instance, controlling the amount of smoke generated with the spread of fire, so as not to obstruct the way for evacuation.)

The ceilings and walls of buildings subject to those restrictions must be finished, according to fire safety properties required of the part concerned, with:
- NC (noncombustible materials);
- Q-NC (quasi-noncombustible materials); or
- FR (fire retardant materials);

certified by the Minister. (see **Table 17**)

Table 17 Restrictions for Interior Finishing Materials

<table>
<tr><td colspan="3" rowspan="2">Usage of the buildings or parts of buildings, and cases where restrictions are applied</td><td colspan="2">Parts where finishing materials must resist fire, and grade of materials required</td></tr>
<tr><td>Rooms</td><td>Corridors, stairs and other passageways</td></tr>
<tr><td>1</td><td>- Theaters
- Movie theaters
- Entertainment halls
- Grandstands
- Public halls
- Assembly halls</td><td>(1) A fire-resistive building, of which seating space (*1) is 400 m^2 or more in total.
(2) A building excluding fire-resistive buildings, of which seating space (*1) is 100 m^2 or more in total</td><td rowspan="3">Internal parts of the wall (excluding the part up to 1.2 m from the floor) and ceiling in habitable rooms (*1) must be finished by FR (Q-NC is required for the 3rd or higher floors).</td><td rowspan="3">Internal parts of the walls and ceiling in corridors, stairs and other passageways that connect the rooms to the ground must be finished by Q-NC.</td></tr>
<tr><td>2</td><td>- Hospitals
- Clinics (limited to those having patient accommodation facilities)
- Hotels/inns,
- Boarding houses
- Apartment houses
- Dormitories
- Welfare facilities(*2)</td><td>(1) A fire-resistive building, of which floor area (*1) on the 3rd or higher floors is 300 m^2 or more in total
(2) A quasi fire-resistive building, of which floor area (*1) on the2nd floor is 300 m^2 or more in total (In the case of hospitals, this is only applied to a building which has a patient accommodation facility on the 2nd floor.)
(3) A building excluding both fire-resistive building and quasi fire-resistive building, of which floor area (*1) is 200 m^2 or more in total
Excluding parts partitioned into fire compartments of 100 m^2 (200 m^2 for apartment houses) or less</td></tr>
<tr><td>3</td><td>- Department stores
- Markets
- Exhibition halls
- Cabarets
- Cafes
- Night clubs
- Bars
- Dance halls
- Amusement halls
- Public bathhouses
- Machiai
- Restaurants
- Dining facilities
- Stores engaged in commodity sales (excluding those with a floor area of 10 m^2 or less)</td><td>(1) A fire-resistive building, of which floor area (*1) on the 3rd or higher floors is 1,000 m^2 or more in total
(2) A quasi fire-resistive building, of which floor area (*1) on the2nd floor is 500 m^2 or more in total (In case of hospitals, only applied to a building which has a patient accommodation facility on the 2nd floor.)
(3) A building excluding both fire-resistive building and quasi fire-resistive building, of which floor area (*1) is 200 m^2 or more in total</td></tr>
<tr><td>4</td><td colspan="2">- Buildings of three stories or more and with more than 500 m^2 of total floor area
- Two story buildings with more than 1,000 m^2 of total floor area
- Single story buildings with more than 3,000 m^2 of total floor area
The followings are excluded:
- Schools, gymnasia, or sports practice facilities;
- Parts of buildings (*1) as specified in No. 2 above and at a height of not more than 31 m;
- Parts of fire-resistive buildings or quasi fire-resistive buildings not for use as special buildings (see 5-3), which are at a height of not more than 31 m and are partitioned into fire compartment of 100 m^2 or less.</td><td>Internal parts of the walls (excluding the parts up to 1.2 m from the floor) and ceiling in habitable rooms (*1) must be finished by FR</td><td>Internal parts of the walls and ceiling in corridors, stairs and other passageways that connect the rooms to the ground must be finished by Q-NC.</td></tr>
</table>

Table 17 Restrictions for Interior Finishing Materials (Continued)

Usage of the buildings or parts of buildings, and cases where restrictions are applied			Parts where finishing materials must resist fire, and grade of materials required	
			Rooms	Corridors, stairs and other passageways
5	- Facilities for the use as mentioned in 1, 2, 3 above, under basement levels		Internal parts of the walls and ceiling in habitable rooms (*1) must be finished by Q-NC.	Internal parts of the wall and ceiling in corridors, stairs and other passageways that connect the rooms to the building exit must be finished by Q-NC.
6	- Automobile garages - Automobile repair shops			
7	- Habitable rooms without windows (Habitable rooms having a floor area exceeding 50 m^2 and a total area of openable parts of openings such as windows (limited to those located in the ceiling or at a position 80 cm or less below the ceiling) less than 1/50 of the floor area of the habitable room concerned. Excluding rooms whose ceiling height exceeds 6 m)			
8	- Habitable rooms, the amount of which openings such as windows for natural lighting is less than the ratio specified in Article 19 paragraph 1 of the *Order*.			
9	- Rooms having equipment that uses a flame, such as kitchens, bathrooms, boiler rooms, etc. The followings are excluded: - Rooms on the highest floor of houses that have two or more stories; - Rooms in buildings whose principal building parts are of *fire-resistive construction*.		Internal parts of the walls and ceiling in rooms (*1) must be finished by Q-NC.	No requirements
10	11th or higher floors	Within fire compartment of 100 m^2 or less	No requirements (*3)	No requirements
		Within fire compartment of 200 m^2 or less (Openings must be protected by *specified fire-preventive assemblies*)	Parts of the walls (excluding the part up to 1.2 m from the floor) and ceiling in rooms must be finished by Q-NC (including backing).	No requirements
		Within fire separation of 500 m^2 or less (Openings must be protected by *specified fire-preventive assemblies*)	Parts of the walls (excluding the part up to 1.2 m from the floor) and ceiling in rooms must be finished by NC (including backing).	No requirements
11	Underground shopping malls	Within fire compartment of 100 m^2 or less	No requirements (*4)	Parts of the wall and ceiling in underground passages must be finished by NC (including backing).
		Within fire compartment of 200 m^2 or less (Openings must be protected by *specified fire-preventive assemblies*)	Parts of the walls (excluding the part up to 1.2 m from the floor)and ceiling in rooms must be finished by Q-NC (including backing)	
		Within fire compartment of 500 m^2 or less (Openings must be protected by *specified fire-preventive assemblies*)	Parts of the walls (excluding the part up to 1.2 m from the floor)and ceiling in rooms must be finished by NC (including backing)	

Notes for **Table 17**:

*1 Exclusively for use as stated in the left column

*2 *Welfare facilities* includes:

-children's welfare facilities;

- maternity clinics;

- rehabilitation facilities for physically disabled persons (excluding prosthetic appliances manufacturing facilities and information centers for visual/hearing impairment);
- social rehabilitation facilities for mentally disordered persons;
- protective institutions (excluding medical protective institutions);
- protective facilities for women;
- facilities for people with intellectual disability;
- welfare facilities for the elderly;
- fee-charging homes for the elderly; and
- maternal and child health facilities.

In No. 2, parts of a *1-hour quasi fire-resistive building* provided for use as a boarding house, apartment house, or dormitory, are treated as a *fire-resistive building*.

*3 In No. 10, parts of buildings partitioned into fire compartments of 100 m^2 or less are not subject to restrictions on materials used. However, such parts are subject to the provisions of No.4, regarding the number of stories and the scale of the building.

*4 In No.11, parts of buildings partitioned into fire compartments of 100 m^2 or less are not subject to restrictions on materials used. However, such parts, when offered for use as specified in No. 1, 2 or 3, are subject to the provisions of No.5.

Remarks:

1) These restrictions are not applied to parts of buildings with both:
   - automatic fire extinguishing equipment (such as sprinklers); and
   - smoke-exhaust equipment.

   Regarding the provisions in No. 10 and No. 11, the floor area limit of the fire compartment may be increased two-times for parts of buildings where automatic fire extinguishing equipment (sprinklers, etc.) are provided.
2) If a building space falls under two or more provisions of restrictions on internal finishes (above), the strictest provisions of the restrictions are applied.
3) Instead of using FR, plywood boards, particle boards and other wooden materials may be used if they meet the specified standard.

5-8 Fire Evacuation

Codes relating to the arrangement and the specification of evacuation measures such as:

- escape stairs;
- smoke exhaust equipment;
- lighting apparatus for emergency use;
- entrances for emergency use;
- elevatory equipment for emergency use;
- etc.

are provided in order to safely evacuate people to ground or to back up fire fighting and rescue.

Where evacuation safety has been verified using *Verification Method for Evacuation Safety*, etc., some *Deemed-to-Satisfy Provisions* may not be applied to the building. (see **3-3 (2)**)

(1) Through Stairs (Direct Stairs)

For prompt escape from upper floors or from the basement, *through stairs*, which connect directly to the evacuation floors that have exits to the ground, must be provided in such a way that the walking distance from any part of the rooms to the *through stairs* be within a certain distance.

Furthermore, large buildings or certain *special buildings* (see **5-3**) must have two or more *through stairs* for emergency, in case when one of them cannot be used. In this case, two or more stairs must be arranged as well as can be so that people can escape in different directions. (The overlap of the walking distances leading to the two or more *through stairs* must not be more than half of the length of the required walking distance.)

(2) *Escape Stairs* and *Special Escape Stairs*

In:
- high-rise buildings;
- buildings with basement floors; or
- buildings used by many people, such as department stores;

ordinary *through stairs* may not be enough to ensure safe evacuation. So, such buildings must have *escape stairs* or *special escape stairs* that have safer performance against fire and smoke than ordinary *through stairs*. (see **Figures 12** and **Figure 13**)

(3) Exits on the Evacuation Floor

Regarding the evacuation floors, there is a limit to the walking distance both:
- from a room to the exits; and
- from *through stairs* to the exits.

(4) Passageways within a Building-site

A passageway within the building-site must be provided from an exit to an open space, such as a roadway, park or public square. This passageway must have a width of 1.5 m or more (3 m or more, in principle, in the case of large wooden buildings).

(5) Smoke Exhaust Equipment

Smoke exhaust equipment must be provided in *special buildings* (see **5-3**) and large buildings in order to effectively eliminate smoke and gas generated from combustible materials, thus ensuring a safe evacuation.

(6) Lighting Apparatus for Emergency Use

Lighting apparatus for emergency use must be provided according to the size of buildings, in order to ensure safe evacuation during a power failure.

(7) Elevatory Equipment for Emergency Use and Entrances for Emergency Use

Buildings with a height exceeding 31 m must, in principle, have elevatory equipment for emergency use for fire fighters. Also buildings must be provided with emergency entrances (elevator equipment, a balcony, or a window through which fire fighters can enter the building) on every floor, beginning with the third floor, up to 31 m in height, so that rescue work and fire fighting activities can be carried out smoothly.

Figure 12 ***Escape Stairs*** **(Example)**

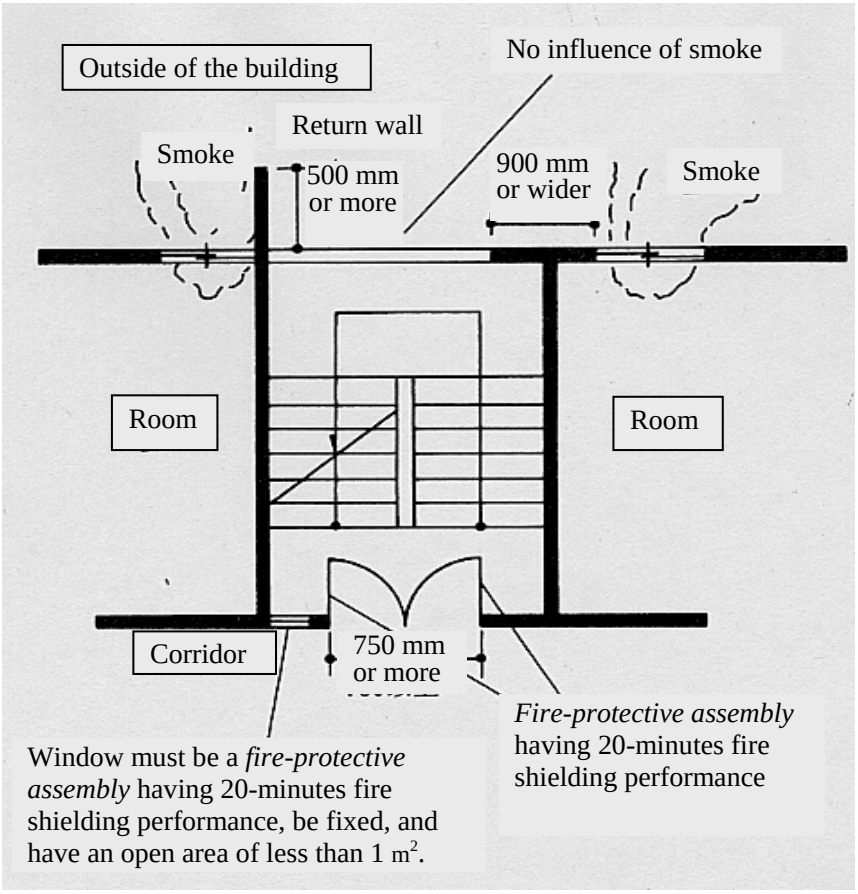
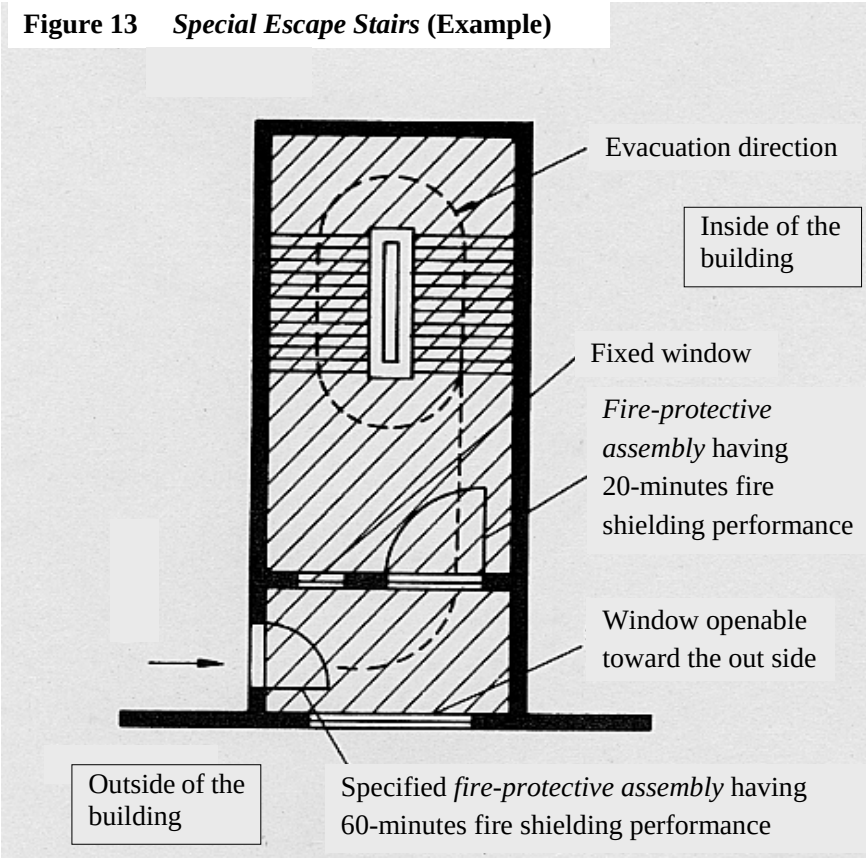


Figure 13 ***Special Escape Stairs*** **(Example)**



Chapter 6 Building Codes for Other Fields

6-1 Codes for Environmental Sanitation and Safety in Daily Situations

(1) Site Safety and Sanitation

Building sites must be prepared and maintained in sanitary and safe conditions for the buildings. The BSL prescribes the following, for example:

(a) sanitary measures for the site, such as proper drainage;
(b) measures to improve the condition of soft soil; and
(c) countermeasures for possible damage to the building by landslides.

(2) Natural Lighting of Habitable Rooms

A habitable room is a space that is continuously used for living, working, meetings, amusement, and so on, and that includes a living room or bedroom in a house, an office room, a meeting room, a theater auditorium, a hall, etc.

Requirements for natural lighting are prescribed from the viewpoint of environmental sanitation. The following habitable rooms must, in principle, have windows and other openings for natural lighting, and the ratio of the effective area thereof to the floor area must be more than a specified ratio for, but not limited to, the following spaces:

- habitable rooms in houses;
- classrooms in schools;
- wards in hospitals or clinics;
- guestrooms in boarding houses; and
- sleeping areas in dormitories.

(3) Ventilation of Habitable Rooms

Ventilation equipment must be installed in:

- habitable rooms in theaters and movie theaters; and
- rooms having equipment that uses a flame, such as kitchens, bathrooms, etc.

There is another requirement of installation of mechanical ventilation equipment for habitable rooms as a countermeasure against chlorpyrifos emitted from furniture, etc. (see **6-1 (4)**)

(4) Countermeasures against Sick Building Issue

There are some requirements in order to prevent harm to human health by the scattering of asbestos or by emissions of other harmful substances from buildings materials.

(a) It is prohibited to add asbestos to building materials.
(b) It is prohibited to use the following building materials:
  - sprayed asbestos; and
  - sprayed rock wool that contains more than 1 % in weight of asbestos;
  excluding those approved by the Minister as those do not cause the scattering or emission of asbestos particles.
(c) In a building with habitable rooms,
  - It is prohibited to use building materials that might emit chlorpyrifos, an insecticide for termites;

- It is restricted to use of building materials that might emit formaldehyde; and
- It is required to install mechanical ventilation equipment, except in traditional wooden houses that have lower air tightness.

(5) Stairs

Some regulations are provided for stairs and for slope-ways (*) from the viewpoint of ensuring safety in daily situations. They relate to:

- the width of stairs and slope-ways;
- the risers and treads of the stairway;
- the degree of the slope;
- the placement of the landings and their width; and
- the placement of the balustrades.

(*) If a slope-way is provided as an additional exit route, and therefore not required in the BSL, these regulations are not applied to such slope-ways.

(6) Others

The following regulations are also provided with respect to the environmental sanitation and safety in the daily use of buildings.

(a) Height of the ceilings of habitable rooms

The height of the ceilings of habitable rooms must be 2.1 m or more (on average in each room).

(b) Height of floors from the ground and methods of damp proofing in habitable rooms

In principle, the first floor of wooden buildings must be 45 cm high, from the ground, or more, and must be provided with ventilation under the floor.

(c) Sound blocking of the separation walls

Separation walls between each unit of row houses or apartment houses must be of a structure that has effective sound insulation.

6-2 Codes for Building Equipment

(1) Wastewater Purifiers

Wastewater purifiers must meet the specified construction methods or a construction method approved by the Minister according to:

(a) the waste treatment requirements for the area of installation; and

(b) the number of persons for whom the purifier is required.

(2) Elevatory equipment

Elevatory equipment must be constructed for safe operation. In addition, hoistways must not become channels for the spread of fire.

Elevatory equipment installed in buildings is classified into the following:

(a) **Elevators**: elevatory equipment (*) that:

- transports people;
- transports people and articles; or
- transports articles, whose cage has a horizontally projected area exceeding 1 m^2, and whose ceiling height exceeds 1.2 m.

(*) excluding escalators

(b) **Escalators**

(c) **Elevatory equipment exclusively for small objects**: elevatory equipment used to transport

articles, and whose cage has a horizontally projected area of 1 m^2 or less, and whose ceiling height is not more than 1.2 m.

(a) Elevators

Cages and principal structural parts of elevators (parts to support or suspend cages) must either:

- meet the construction methods specified by the Minister; or
- have their safety confirmed through the **elevator strength verification method**; or
- be constructed by a construction method approved by the Minister.

Requirements on other parts, such as drive units, machine rooms, and safety devices, are also provided.

(b) Escalators

The slope must be no more than 30°. The width of the steps must be no more than 1.1 m. Steps and principal structural parts of escalators (parts to support or suspend steps) must either:

- meet the construction methods specified by the Minister; or
- have their safety confirmed through the **escalator strength verification method**; or
- be constructed by a construction method approved by the Minister.

Requirements on other parts, such as drive units, trapping prevention systems, and handrail structures, are also provided.

(c) Elevatory equipment exclusively for small objects

The regulations for elevators are partially applied, as necessary.

6-3 Codes for Structures and Amusement Facilities

The BSL applies to:

(1) Structures, such as:
   (a) chimneys exceeding 6 m in height (including any supporting frame or stay wire, but excluding stove chimneys);
   (b) advertisement towers, advertisement billboards, decorative towers, and memorial towers exceeding 4 m in height;
   (c) elevated water tanks, silos, and observation towers exceeding 8 m in height; and
   (d) retaining walls exceeding 2 m in height.

(2) Amusement Facilities, such as:
   (a) elevated amusement facilities such as water chutes, and roller coasters; and
   (b) rotating amusement facilities that use motors such as merry-go-rounds, Ferris wheels, octopus rides, and aero-towers.

The BSL and its related documents provide requirements for the abovementioned in order to secure safety.

Chapter 7 Zoning Codes

7-1 Applicable Regions

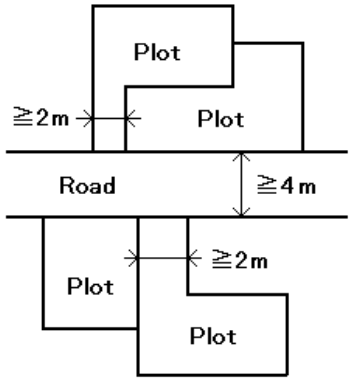
The following restrictions are intended to ensure the orderly arrangement of buildings as a group, in order to maintain a good urban environment. In principle, they are applicable only to *City Planning Areas* (areas designated as city zones under the City Planning Law) and *Quasi City-Planning Areas* (areas other than *city-planning areas*, where future urban improvement and development and utilization could be put at risk if there are no restriction on land use).

7-2 Relation between Building Sites and Roads

(1) Road Access Obligation

The boundary of any building site must, in principle, abut a road for a distance of at least 2 meters, as shown in **Figure 14**.

Figure 14 Road Access Obligation



(2) Restrictions on In-road Buildings

No building or retaining wall may, in principle, be constructed on a road, or in such a way as to protrude onto a road.

7-3 Land Use

From the viewpoint of urban environment and also for the purpose of preventing the proximity of buildings that differ widely in their use:

(1) there are 12 types of land-use zones are designated by the local governments in their respective administrative areas, based on the City Planning Law; and

(2) the use of buildings is restricted by the BSL according to land-use zones.

12 types of land-use zones and their purposes of are shown in **Table 18**. For example, in a zone that is defined as a Residential Zone, the construction of factories and other facilities that would lead to the deterioration of the living environment is restricted, while the construction of schools and hospitals is restricted in areas that are designated as Industrial Zones.

Table 18 Land-Use Zones and their Purposes

Zones and their purposes	Available values of allowable FAR and BCR (see **7-4**)
Category I Exclusively Low-rise Residential Zone: Designated to ensure an excellent living environment for low-rise houses.	FAR: 50, 60, 80, 100, 150, 200 BCR: 30, 40, 50, 60
Category II Exclusively Low-rise Residential Zone: Designated to ensure an excellent living environment primarily for low-rise houses	
Category I Mid/high-rise-oriented Residential Zone: Designated to ensure an excellent living environment for mid/high-rise houses	FAR: 100, 150, 200, 300, 400, 500 BCR: 30, 40, 50, 60
Category II Mid/high-rise-oriented Residential Zone: Designated to ensure an excellent living environment primarily for mid/high-rise houses	
Category I Residential Zone: Designated to ensure a living environment for houses	FAR: 100, 150, 200, 300, 400, 500 BCR: 50, 60, 80
Category II Residential Zone: Designated to ensure a living environment primarily for houses	
Quasi-residential Zone: Designated primarily for promotion of businesses suited to the characteristics of the neighborhood that are adjacent to roads, while at the same time preserving an excellent living environment	
Neighborhood-Commercial Zone: Designated for the promotion of convenience for conducting commercial and other kinds of business to supply daily necessities to the inhabitants of nearby residential areas.	FAR: 100, 150, 200, 300, 400, 500 BCR: 60, 80
Commercial Zone: Designated primarily for the promotion of convenience for commercial and other kinds of business	FAR: 200, 300, 400, 500, 600, 700, 800, 900, 1000,1100, 1200, 1300 BCR: 80
Quasi-industrial Zone: Designated primarily for the promotion of convenience for industries which are not likely to damage the environment	FAR: 100, 150, 200, 300, 400, 500 BCR: 50, 60, 80
Industrial Zone: Designated primarily for the promotion of convenience for industries	FAR: 100, 150, 200, 300, 400 BCR: 50, 60
Exclusive Industrial Zone: Designated for the promotion of convenience for industries	FAR: 100, 150, 200, 300, 400 BCR: 30, 40, 50, 60
Areas where land-use zones are not designated	FAR:50, 80, 100, 200, 300, 400 BCR:30, 40, 50, 60, 70

7-4 FAR (floor area ratio) and BCR (building coverage ratio)

FAR and BCR are calculated by the formulas below:

$$\text{FAR (\%)} = \frac{\text{total floor area}}{\text{site area}} \times 100 \qquad \text{BCR (\%)} = \frac{\text{building area}}{\text{site area}} \times 100$$

Allowable FAR and allowable BCR are determined by each city planning commission in accordance with the situation of the respective regions. Their values are, in principle, chosen from "the available values of allowable FAR and BCR" which are stipulated in the BSL, as shown in **Table 17**. (Allowable FAR and BCR in areas, where land-use zones are not designated, are determined by the Designated Administrative Agencies instead of city planning commissions.)

Allowable FAR is reduced in case where the front road of the site is narrow.

7-5 Building Lot Size

In an effort to discourage the development of small-scale projects that involve the subdivision of an existing single lot, the respective city planning may stipulate the minimum allowable building lot size up to 200 m^2, in order to ensure an excellent living environment.

7-6 Building Height

(1) Building height restrictions in *Category I/Category II Exclusively Low-rise Residential Zones*

Category I and Category II Exclusively Low-rise Residential Zones are specified so that an excellent living environment for low-rise residences is maintained. In these regions, it is prohibited, in principle, to build a building whose height exceeds 10 m or 12 m, whichever is specified under city planning.

(2) Slant Plane Restrictions (allowable building height in proportion to the distance from the boundary)

These restrictions are designated to limit the height of buildings according to:

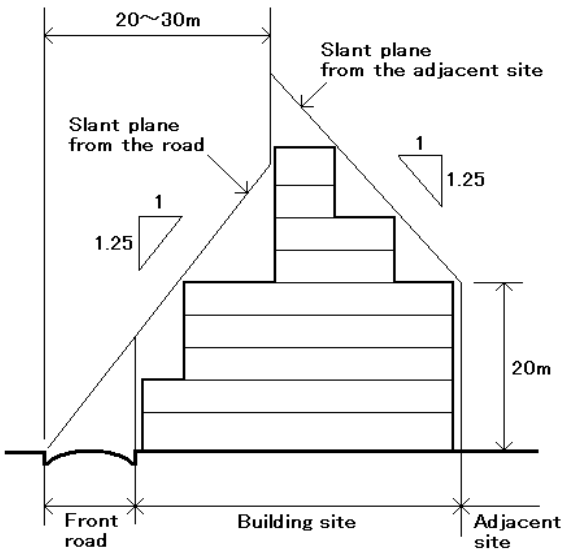
(a) the distance from each part of the building to the opposite side of the road that it faces (the slant planes from the roads); and

(b) the distance from each part of the building to the adjacent site boundaries (the slant planes from adjacent sites); and

(c) the distance from each part of the building to the north boundary of the site (the slant planes from the north-facing adjacent sites).

This is to ensure that there is enough unobstructed space for light and ventilation between buildings and on streets. The degree of application of these slant plane restrictions differs according to each land-use zone. (see **Figure 15**)

Figure 15 Image of Slant Plane Restrictions
(In the case of residential land use area)



(3) Shadow Restriction

Shadow restriction aims, in principle, to limit the height of buildings so as to ensure sufficient sunlight in residential zones. The local governments may designate areas (*1) where this restriction applies, and *allowable hours of shadows* (*2) for each designated areas.

(*1) The following land-use zones can be designated:

- *Category I and II Exclusively Low-rise Residential Zone*s;
- *Category I and II Mid/high-rise-oriented Residential Zones*;
- *Category I and II Residential Zones*;
- *Quasi-residential Zones*;
- *Neighborhood-Commercial Zones*;
- *Quasi-industrial Zone*s;
- Areas where no land-use zones are designated.

(*2) *Allowable hours of shadows* means a period of hours per day in which buildings may cast shadows outside of their respective areas.

7-7 Special Exceptions Relating to Bulk/Height Control of Buildings

Fundamental restrictions relating to the bulk (FAR and BCR) and height of buildings have been briefly described above, but there are also various exceptions to those restrictions. The following are special restrictions aligned with the purpose of city planning:

(1) *Height Control Districts* (designated in city planning as districts where the minimum and/or maximum height of buildings is stipulated);

(2) *Efficient Land Utilization Districts* (where the maximum and minimum FAR and BCR, etc. can be determined in city planning as exceptions to the general standards);

(3) *Specified Blocks* (where construction is implemented in a specified block in a city according to city planning with alleviated FAR);

(4) *Special District for Urban Renaissance* (where urban renaissance is promoted according to city planning with alleviated FAR, etc.);

(5) *System for Integral Design* (when building sites are of a certain size, including sufficient open space, one can receive a special exemption from FAR and the restrictions on slant planes, etc. if the *Special Administrative Agency* recognizes that construction of the building will contribute to the improvement of the city environment); and

(6) Others.

7-8 Building Restrictions in *Fire Protection Zones*

See **5-2 (7)** and **5-4**.

7-9 Building Restrictions in Areas of District Plan

In cases where a District Plan is in force as a part of city planning for the purpose of providing and protecting a favorable city-area environment that is suitable to the characteristics of the area, a city, town, or village can enact bye-laws to determine restrictions relating to matters that are particularly important concerning the site, use, construction, and equipment of buildings, as specified in the content of the District Plan.

7-10 Building Agreements

In the interest of maintaining and further promoting a favorable living environment in residential areas and convenience in commercial areas, the BSL permits high-level standards exceeding the requirements of the general standards relating to buildings, to be determined by agreement (building agreements)

among the residents of the area. These building agreements determine standards relating to the building site, position, construction, use, form, design and/or equipment by mutual consent of all landowners, etc. Such agreements come into effect through approval by the Designated Administrative Agency.

7-11 Comprehensive Design Systems for Estates and Design Systems for Continuous Buildings

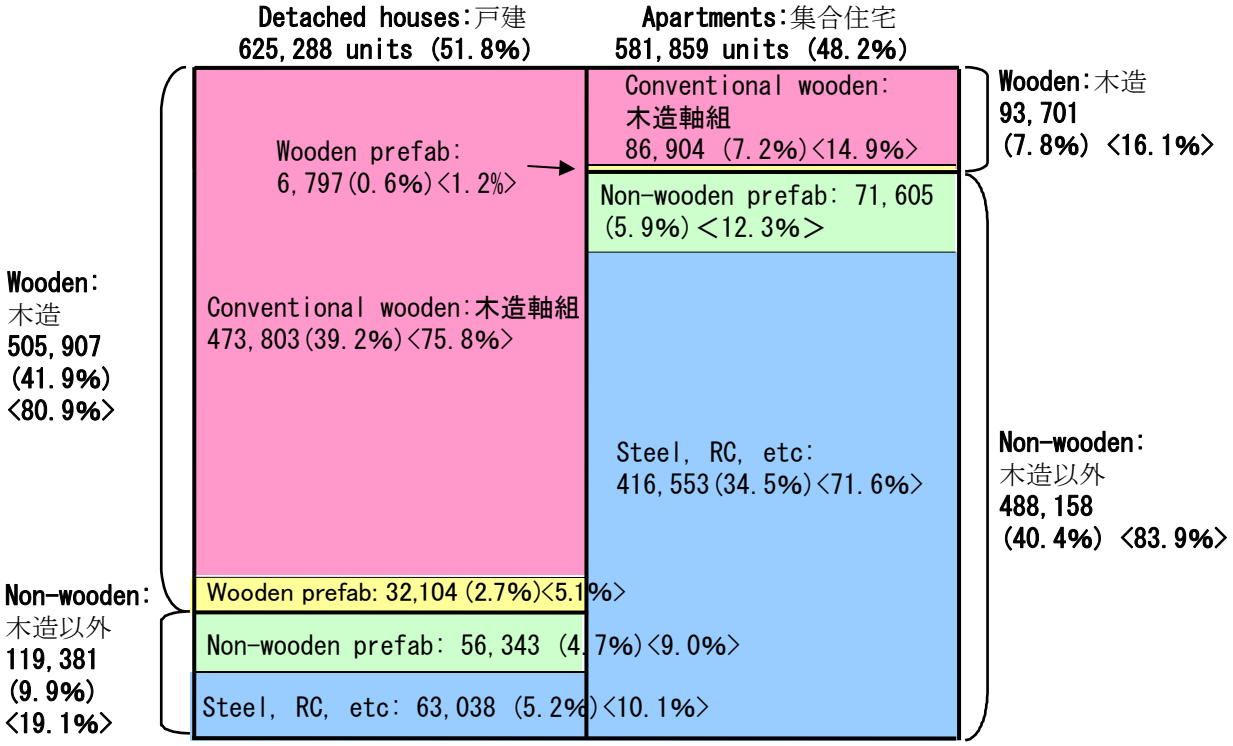
Where an integrated design is used for multiple buildings on an area of land within a single estate (comprehensive design systems for estates), or where multiple buildings are designed to harmonize with existing buildings (design systems for continuous buildings), multiple buildings with coordinated plans will be subject to uniform road access obligation (**7-2 (1)**), FAR, slant lines, etc., within the same site.

Annex 1 **Structural Types of Newly Built Housing in Japan** 日本の新規着工住宅（構造別）

Notes: Percentages of total housing units are shown in round brackets: ( ).
Percentages of total detached houses or apartments, respectively, are shown in arrow brackets: < >.

Source: Statistical Survey of Housing Construction Starts (1984 and 2006)

FY 1984 Total units of new housing starts: 1,207,147 1984 年度：約 121 万戸



FY 2008 Total units of new housing starts: 1,039,180 2008 年度：約 104 万戸