Kobe City’s Practice and Experience in Building Regulation for Resilience
Key Points

1. Damage caused by the Great Hanshin-Awaji Earthquake in 1995
2. Procedures for Building Confirmation and Inspection
3. Guidance to Buildings in Violation
4. Kobe’s Retrofitting Program
5. Summary
1. Damage caused by the Great Hanshin-Awaji Earthquake in 1995
Summary of the Great Hanshin-Awaji Earthquake

Date: January 17, 1995, at 05:46 JST
Magnitude: M 7.2
Japanese seismic intensity: Max (Level 7)
Epicenter location: the northern part of Awaji Island
Depth: 14km

An epicentral earthquake in large cities due to strike-slip mechanism
Distribution of level 7 of seismic intensity (Japanese scale)

Analysis on level 7 via on-site surveys

Hyogo Pref.
Kobe City

Areas where level 7 was recorded
Casualties of the Earthquake

- Casualties: 4,571 killed in Kobe City (6,433 in total)
- Elderly: Approx. 58% of the casualties were 60+ years of age
- Building collapse was the driver: approx. 73% suffocated or crushed
Collapse of Buildings

Fully destroyed buildings: 67,421
Partially destroyed buildings: 55,145

Damage to Transportation Infrastructure
Damage to City Hall

Building No.2 of Kobe City Hall, of which the sixth story was crushed
2. Procedures for Building Confirmation and Inspection
The Organization of Building Guidance Department in Kobe City Government

- Director
  - Manager (1) Building Coordination Division: Staff (17) Including Architectural Staff (4)
  - Manager (1) Building Safety Division: Staff (32) Including Architectural Staff (28) Facility Staff (4)
  - Manager (2) Safety Measures Division: Staff (22) Including Architectural Staff (14)
  - Manager (1) Earthquake-Proof Construction Promotion Division: Staff (6) Including Architectural Staff (4)

- Major Jobs
  - General Affairs
  - Coordination of building disputes
  - Building confirmation and Inspections
  - Grant permissions related to building confirmation
  - To order correction of illegal buildings
  - Measures against aging hazardous buildings
  - Periodic Inspection Report
  - Earthquake-proofing of buildings
Summary of Kobe City

Area 557.02 km²
Population 1,533,290 (2017)

Achievements of major Jobs (April, 2016 – March, 2017)

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building confirmation (※)</td>
<td>165</td>
</tr>
<tr>
<td>Granted permissions related to building confirmation</td>
<td>111</td>
</tr>
<tr>
<td>Coordination of building disputes</td>
<td>101</td>
</tr>
<tr>
<td>To order correction of illegal buildings</td>
<td>159</td>
</tr>
<tr>
<td>Measures against aging hazardous buildings</td>
<td>19</td>
</tr>
<tr>
<td>Periodic Inspection Report</td>
<td>891</td>
</tr>
<tr>
<td>Earthquake-proofing of buildings</td>
<td>97</td>
</tr>
</tbody>
</table>

※the number of Building Official in Kobe City Government
the number of building confirmation by Designated Confirmation and Inspection Body is 4,406
Application for Building Confirmation and Inspection

Application for building confirmation and inspection
- Rate of application for building confirmation and inspection
  * Nearly 100%, though actual statistics are unavailable

- Rate of final inspections
  * 99.3% in the case of Kobe City (2008)

- Reasons for fulfilling building confirmation and inspection system in Japan
  * Kenchikushi system (monopoly of duties)
  * Collaboration with financial institutions (loans)
  * Heightened awareness due to the impact of damages caused by the earthquake
Interim Inspections

- Institutionalized as the Building Standard Law revised in June 1998
- The collapse of a large number of buildings due to the Great Hanshin-Awaji Earthquake in 1995 shed light on the importance of securing the safety of buildings.
- An interim inspection will be conducted by building officials, etc. at the time a predetermined specific construction stage is completed. The construction work may not proceed to the subsequent stages without the issuance of the certificate of successful interim inspection.
Interim Inspections

- Buildings which must undergo interim inspections (in the case of Kobe City)

<table>
<thead>
<tr>
<th>Use of building</th>
<th>Size (No. of stories / area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Detached housing and multipurpose housing</td>
<td>Buildings with a total floor area of 10 square meters or more</td>
</tr>
<tr>
<td>2  Any buildings other than those to be used for the</td>
<td>Buildings with a total floor area of 200 square meters or more</td>
</tr>
<tr>
<td>purposes cited above</td>
<td>Two- or more-storied buildings whose total area exceeds 50 square meters (or 100 square</td>
</tr>
<tr>
<td></td>
<td>meters for certain purposes)</td>
</tr>
</tbody>
</table>
Interim Inspections

- **Timing of Inspections**

Interim inspections will be conducted after the completion of the following work.

<table>
<thead>
<tr>
<th>Structure of buildings</th>
<th>Process concerning foundation work</th>
<th>Process concerning erection work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber-building (of one or two stories)</td>
<td>Bar arrangement of foundation</td>
<td>Erection work</td>
</tr>
<tr>
<td>Timber-building (of three or more stories)</td>
<td>Bar arrangement of foundation</td>
<td>Erection work</td>
</tr>
<tr>
<td>Steel construction</td>
<td>Bar arrangement of foundation</td>
<td>Installation work of floor slabs for the second story</td>
</tr>
<tr>
<td>Reinforced concrete structure</td>
<td>Bar arrangement of foundation</td>
<td>Bar arrangement work for the floor of the second story</td>
</tr>
</tbody>
</table>
Example of Interim Inspection

* Case of Steel Construction (Erection Work)

• An inspection will be conducted at the stage where steel frames have been established and floor slabs laid down.

• No work may be conducted towards the walls, such as the work to cover the steel frames, until the construction work up to this stage has passed the inspection.
Example of Interim Inspection

At the time of the inspection, a request will be made to submit various data on the processes up to that stage.

- Certificates of materials of steel frames and reinforcing bars
- Reports on the welded parts of inspections and tests of steel frames and reinforcing bars
- Compressive strength tests
- Photographs
  etc.
**Periodic inspection Report**

Reporting is requested **once every three years** in terms of Groups

<table>
<thead>
<tr>
<th></th>
<th>Use</th>
</tr>
</thead>
</table>
| A | (i) Theaters, cinemas, entertainment halls  
(ii) Viewing halls, public halls, assembly halls  
(iii) Museums, art galleries, libraries, bowling alleys, swimming pool buildings, places for practicing/exercising sports  
(iv) Schools, gymnasium  
(v) Department stores, supermarkets, retail premises for merchandising business, exhibition halls |
| B | (vi) Hospitals and clinics, child welfare facilities (including welfare facilities for the elderly, etc.)  
(vii) Hotels or Japanese inns  
(viii) Business offices, and other premises such as business offices |
| C | (ix) Apartment buildings  
(x) **Public bathhouses**  
(xi) Cabarets, cafes, night clubs, restaurants, etc |
3. Guidance to Buildings in violation
Tendencies of Buildings in violation

◆ As the final inspection ratio has improved, the number of newly constructed illegal buildings has declined.
  
  Fy2015: 13 cases  (Fy1999: 235 cases)

◆ Violation in case of extension work and change of use is significant.
  
  • Failing to observe the regulation to set back from the center of the road
  
  • Constructing a building with the building-coverage ratio or the floor-area ratio exceeding the statutory limit
  
  • Use of a building in violation (using the first floor of a residential building as a workshop, etc.)
  
  • Addition to a building without the relevant license, and any of the above-mentioned violations of laws/ordinances due to the extension, etc.
Flow of Correcting Buildings in Violation

- Patrolling, report, etc.
- Confirmation of the fact of illegality (on-site survey)
- Guidance to suspend construction work, etc. (on site)
- Approval
- Correction work
- Order for suspension of construction work
- Guidance for correction (guidance, recommendation, advice, etc.)
- Instruction concerning corrective plans, etc.
- Order to take corrective measures
- Accusation
- Prosecution and criminal charges

Ordering Process: Approval → Correction work → Correction → Accusation → Prosecution and criminal charges
Early discovery of illegal buildings
- Voluntary patrol (throughout year) to survey new construction sites
- Simultaneous patrol (1wk x 2/year)
- Individual investigation based on 110 violation reporting

Early correction
- Guidance for correction (guidance, advice, recommendation, etc.)

Proper handling
Following response to malicious or highly risky violation:
- Order under Building Standard Law Article 9
- Request for suspending energy supply (for new buildings)
- Report to Minister of Land, Infrastructure and prefectural governors (Law Article 9.3)
- Accusation
- Administrative subrogation
4. Retrofitting Program
3) Seismic Retrofit of “buildings used by many people”

Major activities to promote seismic retrofit

**Large-scale buildings of which the seismic diagnosis are mandatory**
(Large-scale buildings require immediate safety confirmation)

Targets:
- Buildings used by **many and unspecified people** such as hospitals, shops, and hotels,
- buildings of which **the users require assistance in evacuation** such as schools and nursing homes,
- Large buildings store/process more than certain amount of **hazardous materials** (5000m² or more, except for specified use)

- **Amendment to the law in 2013** made implementation and report of **seismic diagnosis** mandatory.
  
  Report deadline: End of December of 2015 → Results published on March 29, 2017

- **Subsidy mechanism** to support seismic retrofit of targeted buildings
  
  Kobe City’s subsidy program for seismic retrofit of large-scale buildings requiring immediate safety confirmation (2014-)
  
  - Could be used alongside with subsidy program by the national government
  
  - Increased amount of subsidy for buildings that signed agreement with the city to allow the use as welfare evacuation facilities (e.g. hotels and guest houses) in FY2015
3. Summary: Seismic Retrofit Plan in Kobe City [2016-2020]

1) Achievements

• **The seismic retrofit rate reached 91% in 2013** from 84% in 2003 when the previous plan was developed.

• The seismic retrofit rate of public housing owned by the city reached 85% in 2014, compared to 75% in 2007 when the previous plan was developed.

• The seismic retrofit rate of private buildings marked 82% in 2014, compared to 75% in 2007 when the previous plan was developed.

• The seismic retrofit rate of public buildings achieved 98% in 2015, compared to 68% in 2007 when the previous plan was developed.
2) Setting goals for seismic retrofit of houses

Seismic retrofit goal: 95% of homes to be seismic-resistant by 2020.

To achieve the target, it requires to reduce 30,000 houses considered as non-seismic-resistant in 7 years, out of 67,000 non-seismic-resistant houses (estimation in FY2013).

Need 1.5 faster speed to achieve the target, compared to the speed during the previous plan period.
2. Promoting seismic retrofit of houses and buildings

1) Awareness raising

**Inform widely**
- City magazine “KOBE”
- Newspaper ad, TV, Radio
- Door-to-door drops

**Inform in details**
- Open house of earthquake-resistant house
- Consultant session

**Inform directly**
- “Intercom action” in cooperation with the local community
- Staff visit

**For the next generation**
- Seismic diagnosis training (for high school students in architectural course)
- Classes on seismic resilience (housing education)

---

Kobe City, “Seismic-resilience Campaign” (every September and October)

Cooperation between group of experts and civil societies

Use of seismic-resilience mascots
Seismic-resilience mascots
(Okiru Hakase)

Visiting seismic-retrofit houses
(house visit)
“Intercom action” in the community
“door-to-door visit”

Housing education
(Classes on seismic-resistance)
5. Summary
Conclusion

- In Japan, responsibility for illegal buildings is borne by
  - Designers (*Kenchikushi*)
  - Builders

- The national and municipal government:
  - are required to ensure that accidents similar to those that have happened in the past do not occur in future by reviewing building standards and systems
  - also prevent violations through inspections and patrols
  - take responsibility, however, if due care and attention are not taken in the course of their business (whether it be intentionally or through negligence)
ANNEX: Additional Slides of Interest
Summary of Kobe City
Summary of Kobe City

Area  
557.02 km²

Population  
1,533,290  (2017.03.31)
Legislation

◆ Local governments in Japan

There are two levels of local governments in Japan

- 47 prefectures
- 787 cities, 748 towns, 184 villages; and 23 wards in Tokyo.

A president of each local governments is directly elected by its residents, who is called a Governor or a Mayor. All members of each parliament of local governments are directory elected by its local residents.
Final Inspections

- [Plate, Approved by Final Inspection]

The proportion of buildings subject to final inspections rose from 44.0% in FY1998 to 99.8% in FY2014.
Changes in Final Inspections Ratio (nationwide and Kobe)

- Number of confirmation
- Number of issuance
- Ratio (Japan)
- Ratio (Kobe)
Periodic Inspection Report

【 Purposes 】
The safety of buildings will be ensured by stipulating that owners and administrators of buildings are required to report the results of periodic surveys and inspections on their buildings, elevators, etc.

【 Provision as Grounds 】 (Building Standard Law Article 12)
The owner and administrator of a building, etc. designated by a designated administrative agency shall have a qualified person with the relevant expertise to survey and inspect the premises, structure and construction facility of the building regularly and report the results thereof to the agency.
Provision as Grounds, etc.

◆ Order of measures against buildings in violation (Article 9 of the Building Standard Law)

Designated administrative agencies may give mandates to take necessary measures to correct illegality with respect to buildings or sites of buildings which violate the provisions, etc. of any article of the Building Standard Law.

[Intended parties]
Building owner, contractors, and operational managers of the construction work, owners and administrators of the site, etc.

[Measures to correct illegality]
Suspension of the construction work, removal, transfer, renovation, extension, repair, redecoration, prohibition of use of buildings, etc.

◆ Penal provisions
Any party which fails to comply with the order will be sentenced to imprisonment of 3 years or less or fines of 3 million yen or less.

◆ Administrative Punishments
Kenchikushi … admonition, suspension of business for not more than 1 year, rescission of license
Building constructors … suspension of business for not more than 1 year, rescission of permissions
Housing constructors … suspension of business for not more than 1 year, rescission of license