Pre–Seismic Risk Assessment and Mitigation

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5-4-2026

What is Pre-Seismic Risk Assessment?

- Evaluation of earthquake risks before an event
- Identifies vulnerable buildings and areas

Helps plan safety measures in advance

Why Pre-Seismic Risk Assessment is Important?

- Saves lives
- Reduces property damage
- Improves emergency response
- Supports safer urban planning

Key Components of Risk Assessment

- Hazard assessment (earthquake probability)
- Vulnerability assessment (building strength)
- Exposure assessment (people & assets at risk)

Seismic Hazard Assessment

- Study of fault lines and past earthquakes
- Ground shaking intensity prediction
- Soil condition analysis

Building Vulnerability Assessment

- Structural design evaluation
- Construction material quality
- Age and maintenance of buildings

Identification of weak structures

Risk Mapping

- Use of maps to show high-risk areas
- Helps in planning and decision-making
- Commonly done using GIS technology

Mitigation Strategies

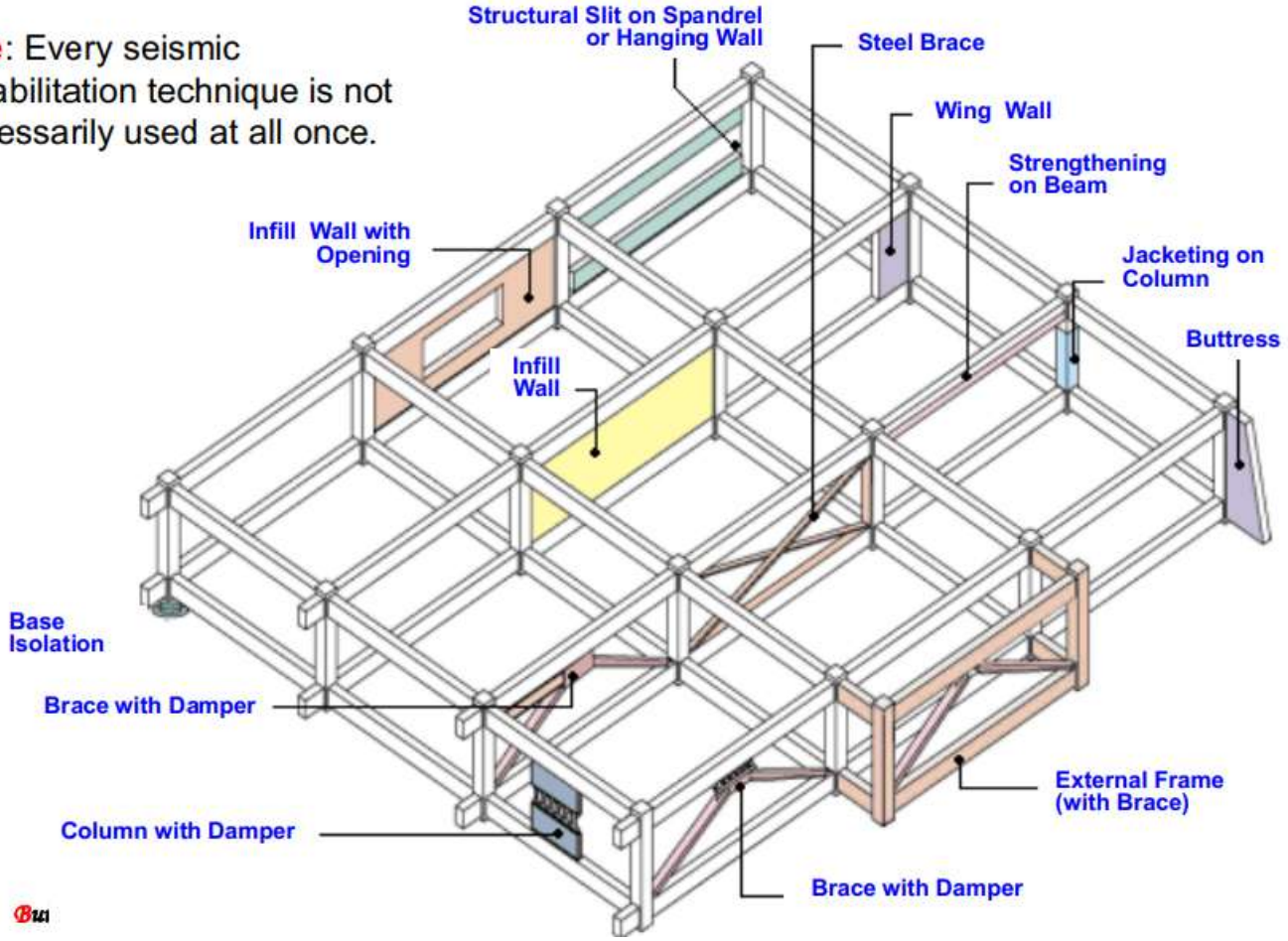
- Strengthening existing buildings (retrofitting)
- Enforcing building codes
- Land-use planning
- Public awareness programs

Retrofitting Techniques

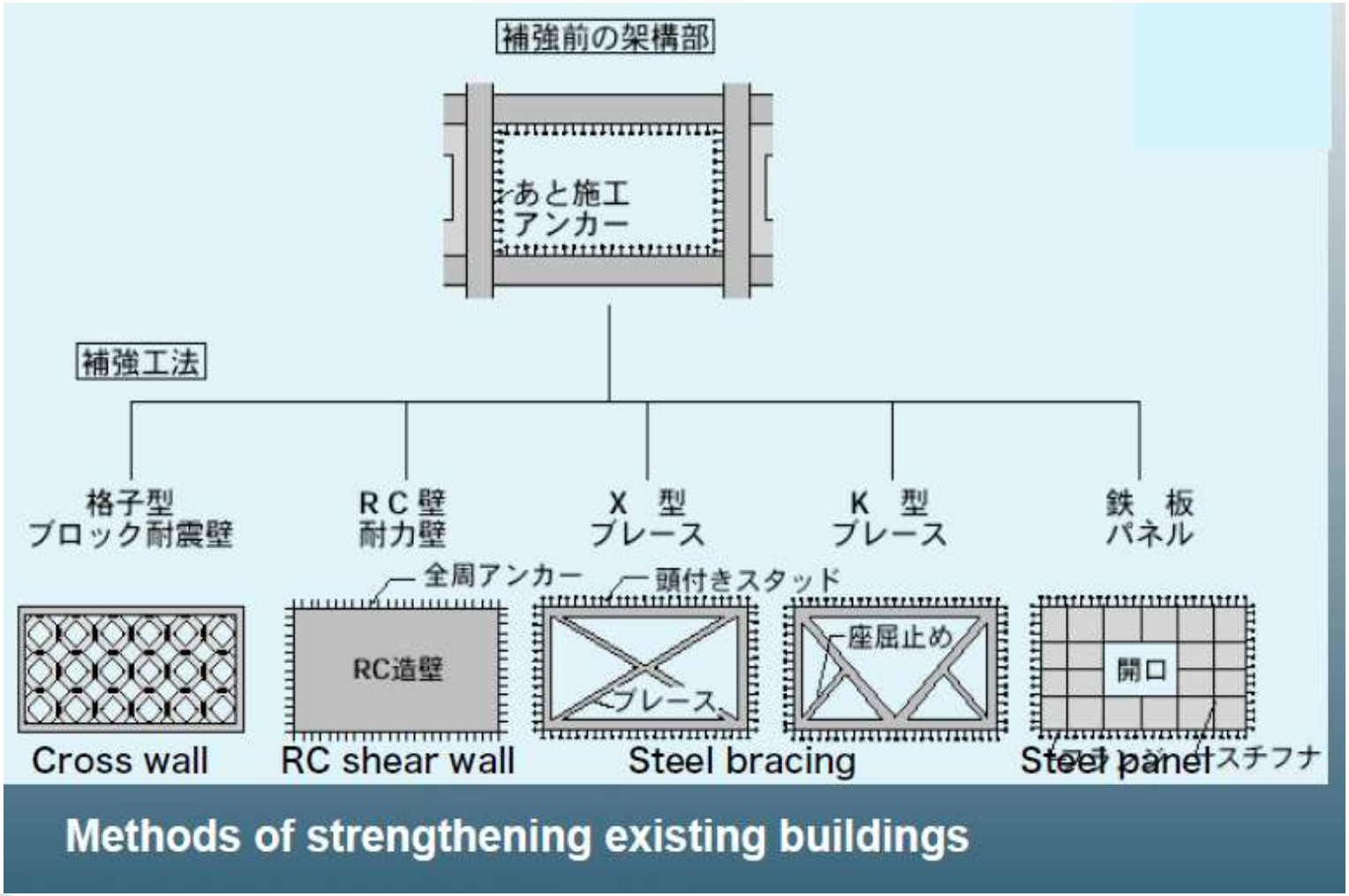
- Adding steel braces
- Strengthening foundations
- Installing shear walls
- Using base isolation

Seismic Rehabilitation Techniques

! Note: Every seismic rehabilitation technique is not necessarily used at all once.



Retrofitting Techniques



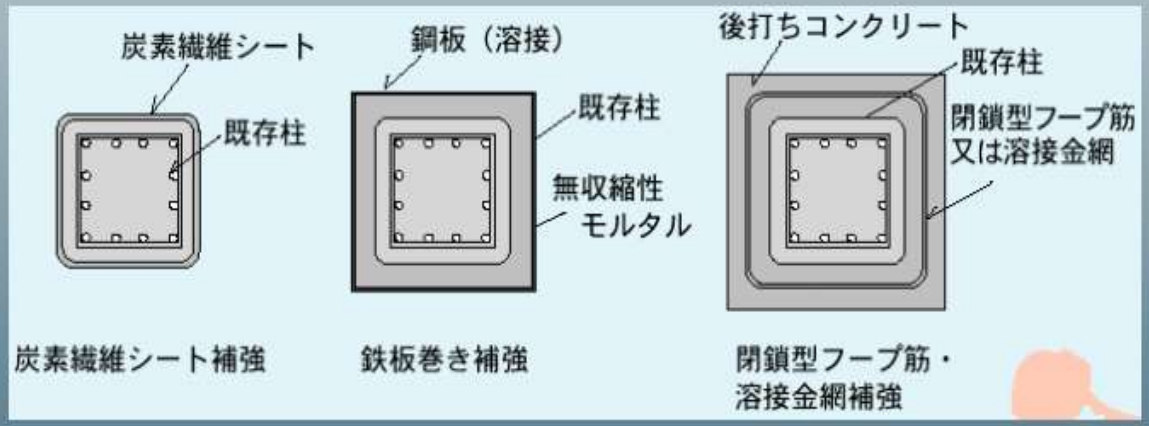
Seismic Retrofitting Techniques

Increase the ductility of the column

Jacketing with carbon sheet

Jacketing with steel tube

Jacketing with RC

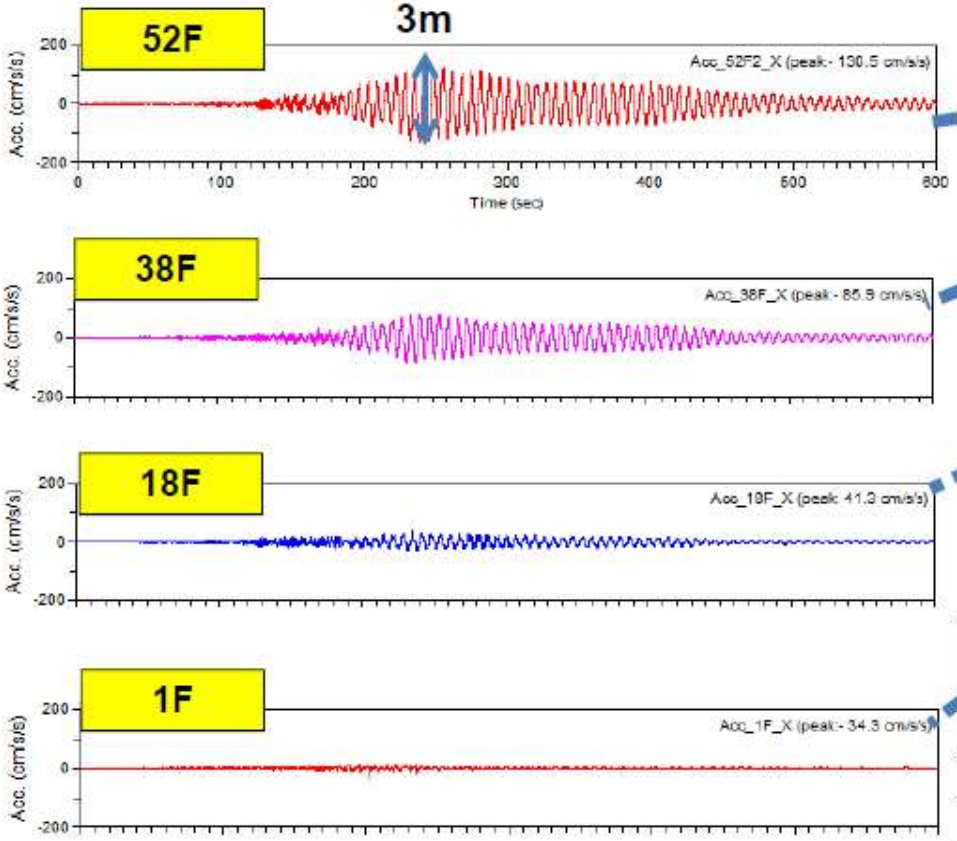


Seismic Retrofitting Techniques

8-storied building with
168 housing units

Cost: 388 million yen

Response of a high-rise office building in Osaka during 2011 Great Tohoku Earthquake



	ACC (cm/s^2)	VEL (cm/s)	DISP (cm)
52F	131	134	136
38F	86	82	85
18F	41	29	29
1F	34	10	9

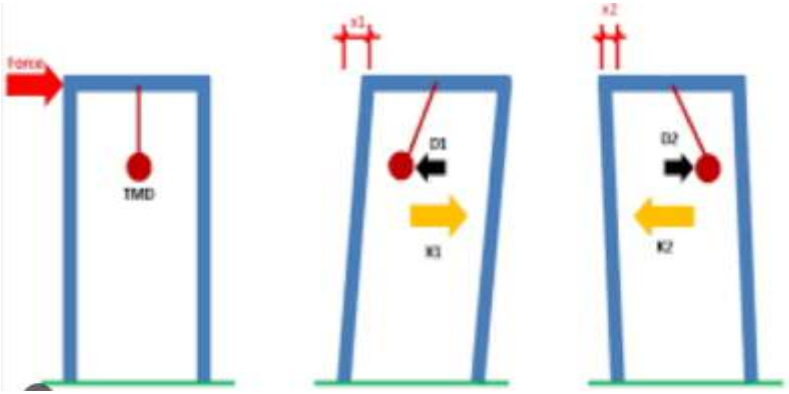
Seismic Retrofitting Techniques

Seismic Retrofitting Techniques

Main Drift Control Devices

- Viscous Damper

- Tuned Mass Damper (TMD)



Main Drift Control Devices

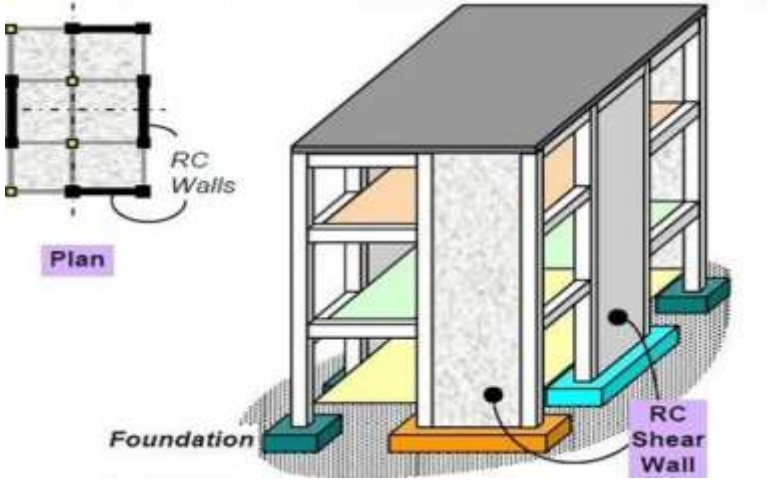
- Metallic Yield Dampers

- Friction Dampers

BRB , Shear Wall & Core Wall Systems

Buckling-Restrained Braces (BRB)

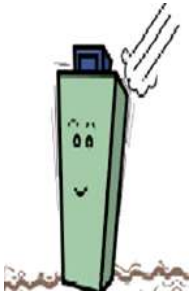
Shear Walls & Core Systems



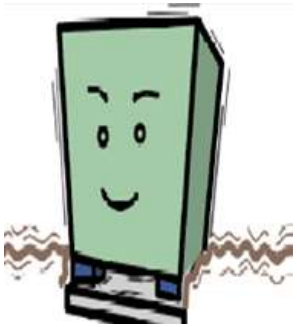
Earthquake Resistant Building

Earthquake Resistant Structure

Response Controlled Structure



Seismic Isolation Structure



Building Codes and Regulations

- Rules for safe construction
- Ensures earthquake-resistant design
- Must be strictly followed

Community Preparedness

- Earthquake drills
- Emergency response planning
- Public education
- Early warning awareness

Challenges

- Lack of funding
- Poor enforcement of laws
- Rapid urbanization
- Limited public awareness

Conclusion

- Pre-seismic assessment reduces disaster impact
- Mitigation saves lives and infrastructure

Preparedness is key to resilience


THANK YOU