

Features of NewRC Design Guidelines

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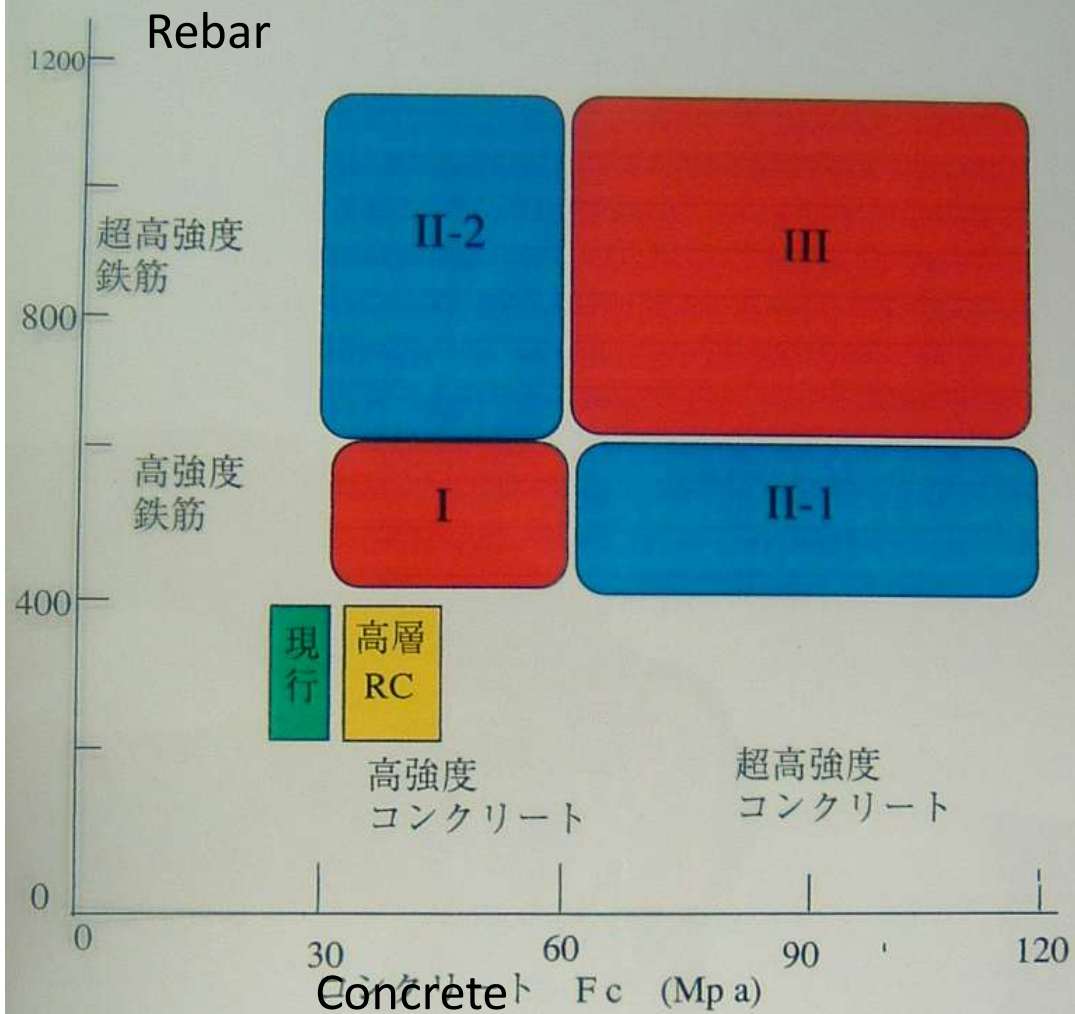
What is NewRC ?

 (New Reinforced Concrete)

- National Project for Developing ultra-lightweight and **ultra-high-rise reinforced concrete buildings**

5-years project 1988 – 1992 FY

- **High-strength, high-quality Concrete and Re-bars** that are two to four times stronger than conventional



- ゾーンI : 高強度材料をもちいたRC造
- ゾーンII-1 : 超高強度コンクリートを用いたRC造
- ゾーンII-2 : 超高強度鉄筋を用いたRC造
- ゾーンIII : 超高強度材料を用いたRC造

NewRC Target

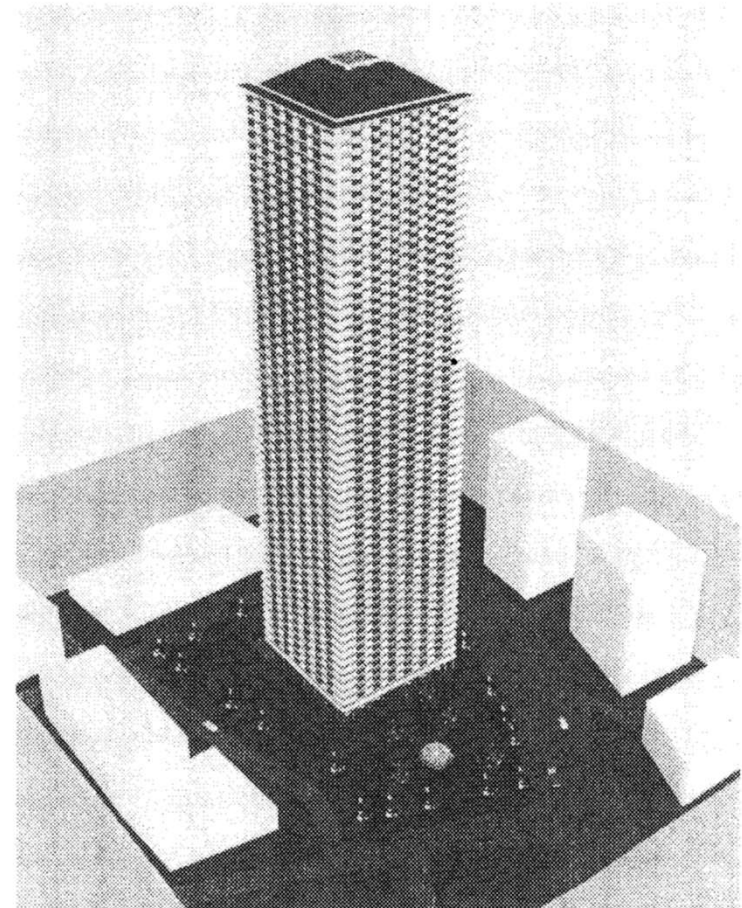


図-5 60階建て超高層集合住宅設計例の鳥瞰

NewRC Design Guidelines (1)

1. General

1.1 Scope 60~200m in height

1.2 Terms

1.3 Seismic Design Criteria Table 1.3.1 & 1.3.2

1.4 Yield Mechanism

1.5 Standards to comply with

2. Materials Quality and Properties Fig. Zoning

2.1 Concrete

2.2 Steel

3. Design for Long Term Loads

- Allowable stress design, no shear cracking

4. Design for Earthquake

4.1 Design Principal

4.2 Earthquake Motions for seismic design

4.3 Building Modeling

4.4 Structural Member Modeling

4.5 Seismic Verification by earthquake response analysis

4.6 Seismic Verification by push-over analysis

4.6.1 Base shear coefficient

4.6.2 Distribution of story shear force

4.6.3 Verification of Building Strength

4.6.4 Guarantee Yield Mechanism

4.6.5 Required strength for non-hinged members

4.6.6 Required ductility for hinged members

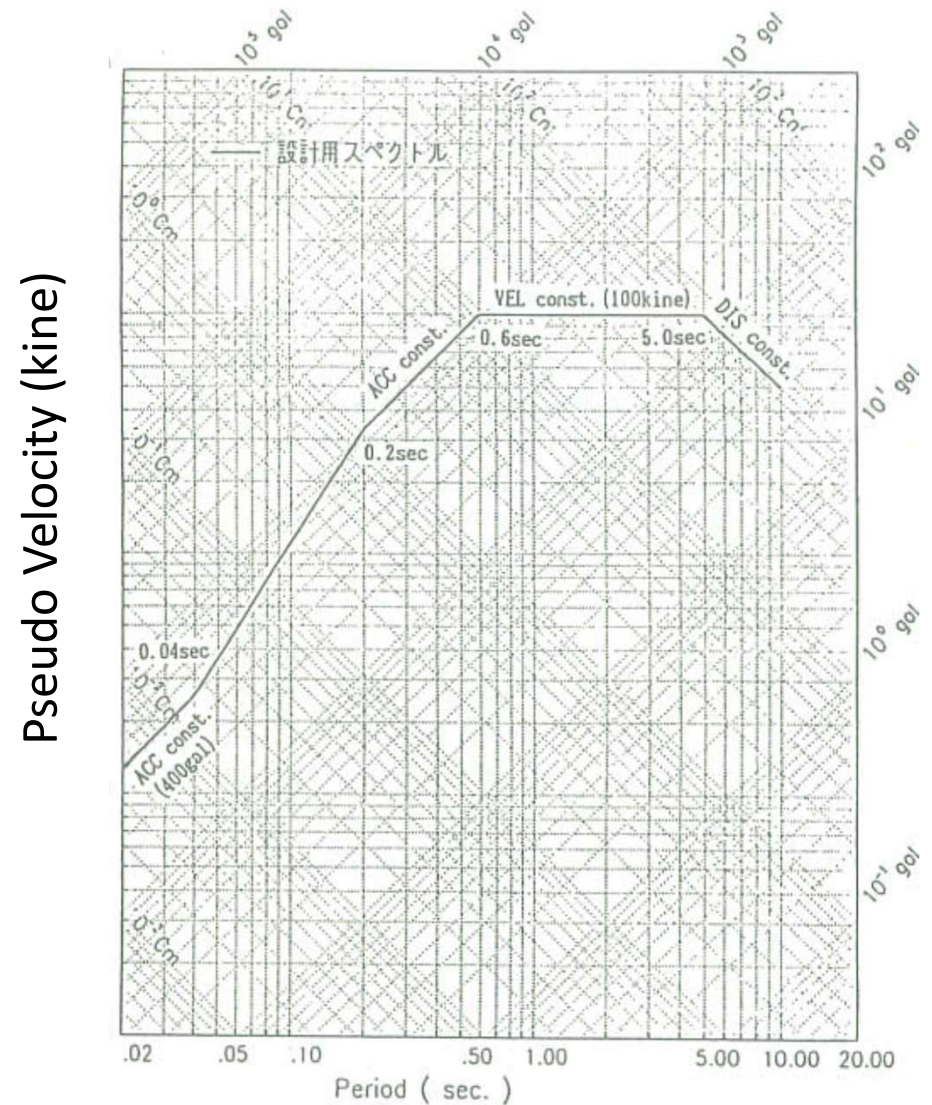
5. Design for Wind

6. Design of Foundation

7. Structural regulations

Input seismic motion

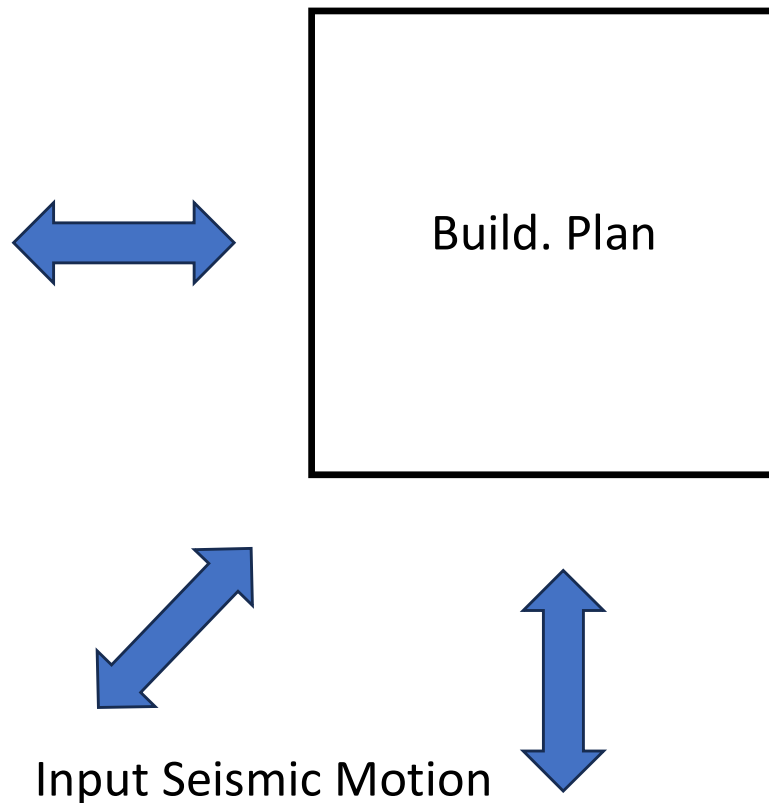
- Level 1: Seismic motion that may be encountered once during the period of use of the building
- Level 2: Maximum seismic motion that could occur at the construction site



Level 2 Response Spectrum

Direction of Input Seismic Motion

Flexural yielding of Beam ends are expected



Moment for Column:
Summation of Component of ΣM_b

e.g.
 $cM_{45} = \frac{\sqrt{2}}{2} (\Sigma M_{bx} + \Sigma M_{by})$

Axial Load for Corner Column:
Summation of shear force of Beams

e.g.
 $cN_{45} = (Q_{bx} + Q_{by})$

Seismic Motion is considered in any direction

1.3 Seismic Design Criteria

Table 1.3.1

EQ. Level	Story Drift	Build. Drift	Hinge
Level 1	\leq Service Limit		Not Allowed
Level 2	\leq Response limit disp. X1.5	\leq Response limit disp.	Hinge in planned position is allowed

Designer sets Service limit Drift as under 1/200.

Designer sets Response limit Drift as under 1/120.

Build. Drift:

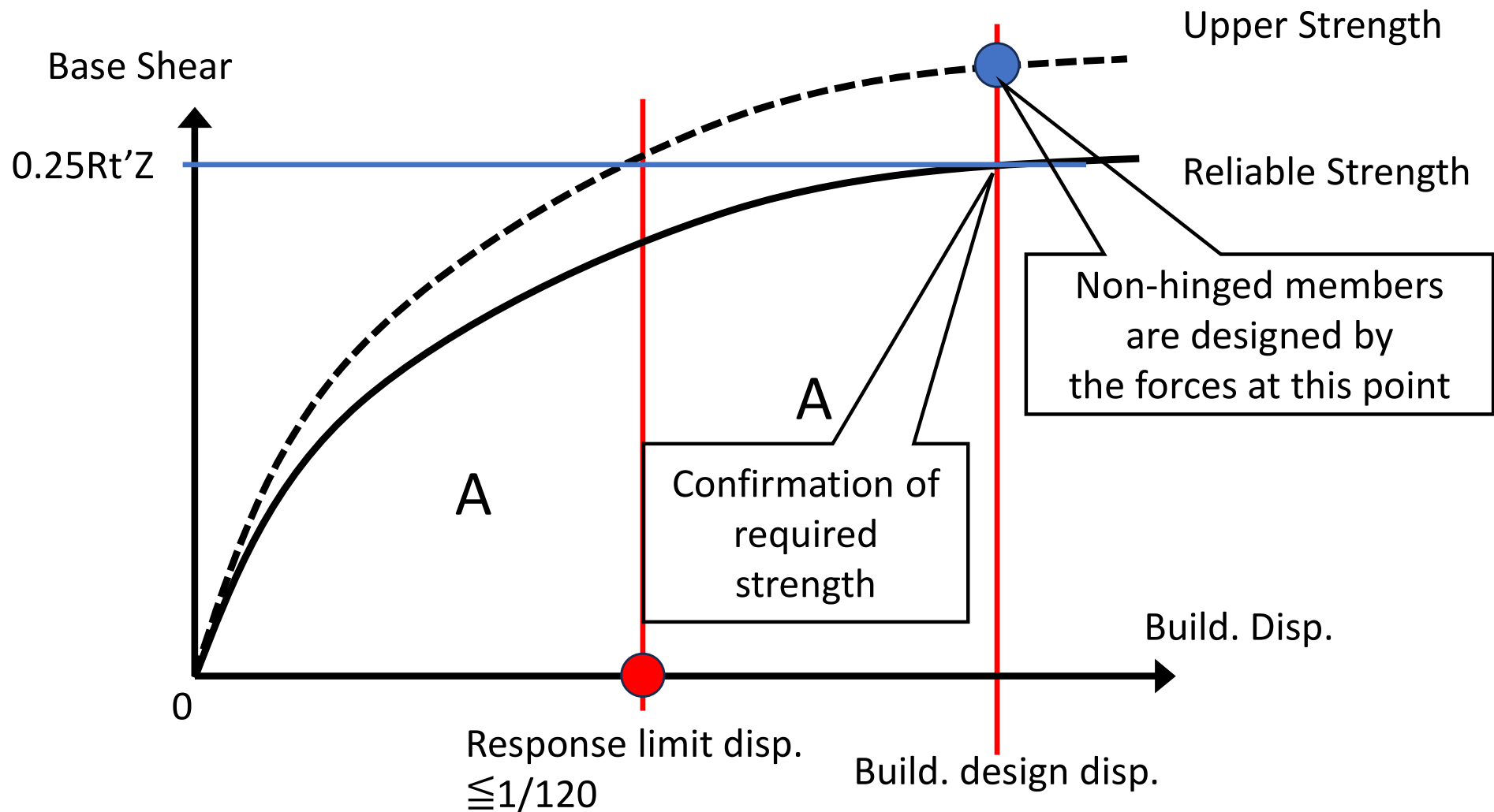
Drift of the equivalent height at response limit deformation.

Table 1.3.2 Requirement at Build. Design Disp.

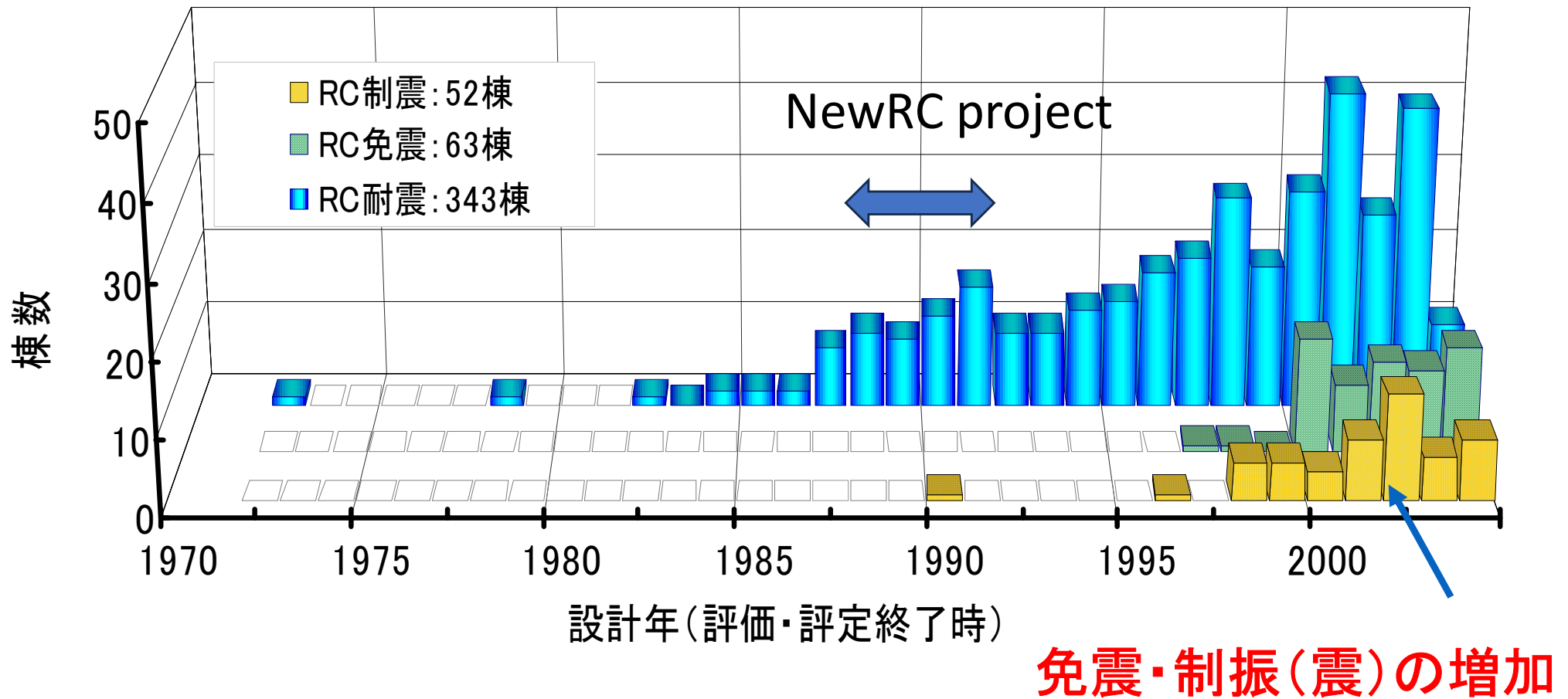
Structural Member		Build. Strength
Hinge member	Enough ductility	Base shear Coefficient
Non hinge member	Enough Strength	\geq $0.25 \cdot R_t' \cdot Z'$

4.6 Seismic Verification by push-over analysis

The shear force distribution is set to envelop the story shear obtained by the seismic response analysis for the response limit deformation.



Conclusions



鉄筋コンクリート造建物の
等価線形化法に基づく耐震性能
評価型設計指針(案)・同解説

AJJ Seismic Performance Evaluation Guidelines
for Reinforced Concrete Buildings Based on
the Capacity Spectrum Method

日本建築学会

AJJ Seismic Performance Evaluation Guidelines for Reinforced Concrete Buildings Based on Capacity Spectrum Method