Efforts made by MEXT

MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

Session3

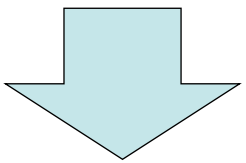
1. Expanded subsidy system
2. Proposed Brief Earthquake Resistance Prioritization Survey
3. Conducted annual surveys on earthquake projects with results disclosed to the public
4. Proposed guidelines for making buildings earthquake resistant, showed examples of progressive efforts
5. Encouraged decisions by mayors
6. Offered individual budgeting and technical advice

2 Proposed Brief Prioritization Survey

PROBLEMS

- Many buildings built before 1981 had problems in their seismic capacity.
- Seismic reinforcement must be carried out efficiently, because it needs great cost and manpower.

- Detailed Seismic diagnosis must be conducted to identify buildings with low earthquake resistance. But It is very expensive.



- Through this survey, many municipalities could easily prioritize the buildings for reinforcement.

Guideline for Promotion of Earthquake-resistant School Buildings (Jul. 2003)

Reference

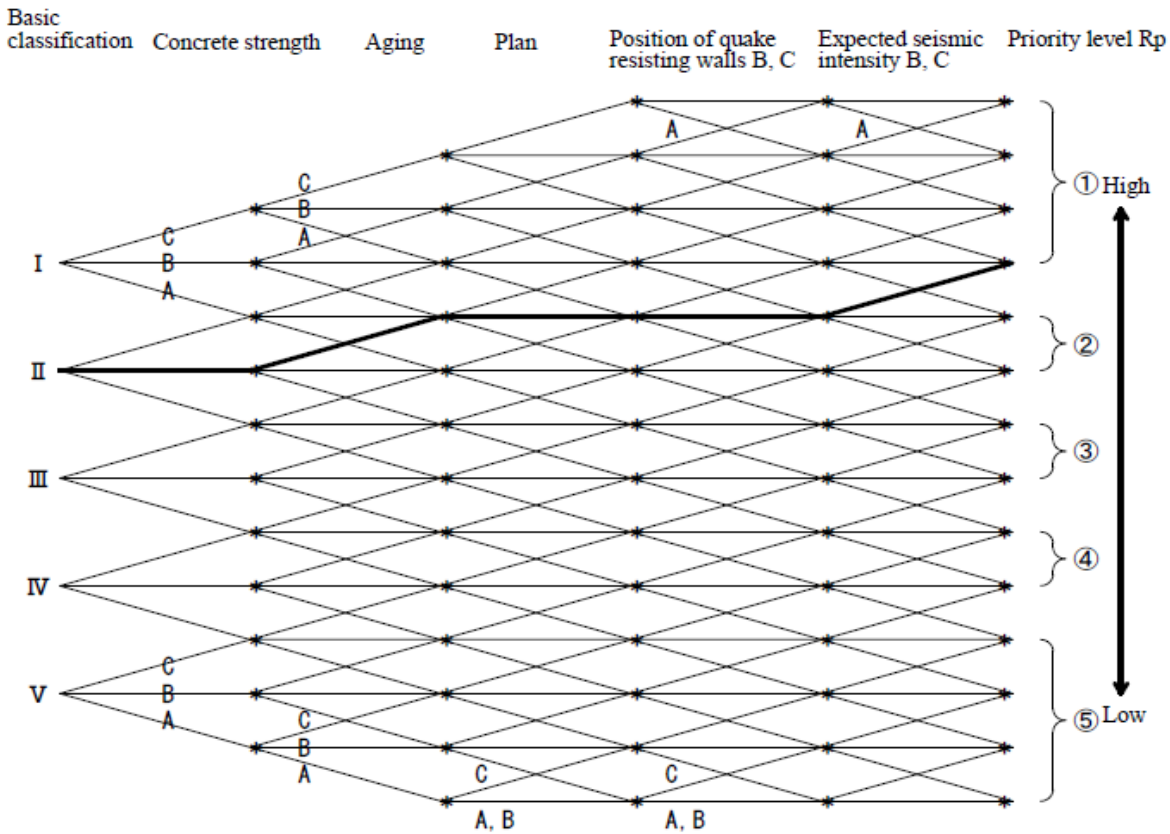
English version can be downloaded from: http://www.nier.go.jp/shisetsu/pdf/e-taishinsuishin.pdf

- Provides how to formulate the promotion plan for earthquake resistance projects to ensure that with a vast number of earthquake resistance projects proceed promptly and steadily.

➢ Points out how to decide which buildings have high priority for earthquake resistance projects.

Summary table on prioritization survey for earthquake resistance projects

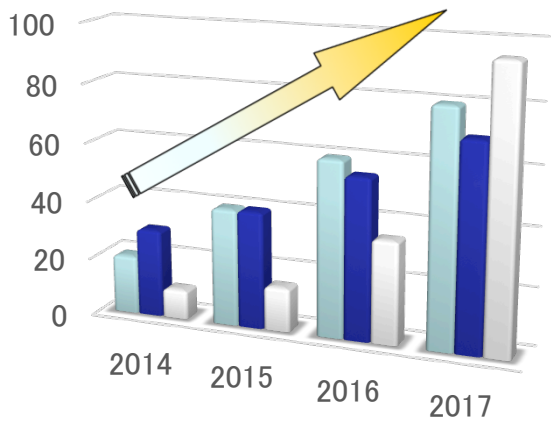
Classification		Evaluation items	Evaluation levels
Basic classification		Construction year ( ), Number of floors ( )	I II III IV V
Correction items	Strength of concrete	Design criteria strength ( ), Strength test value ( )	A B C
	Aging	Corrosion of reinforcing steel ( ), Cracks ( )	A B C
	Plan	Number of span in beam direction ( ), Length of span in girder direction ( )	A B C
	Position of quake resisting walls	Structural frame with missing wall in lower level ( ), Intervals of walls in beam direction ( ), With or without of gable walls ( )	A B C
	Expected seismic intensity	Expected seismic intensity ( )	A B C



Evaluation flow for prioritization

3 Conducted the annual surveys with results disclosed to the public

- Data are also disclosed to the public to show the results and progress.
- MEXT ranked municipalities by the percentage and the number of earthquake-resistant schools.
- This tactic has proved effective in stimulating municipalities to take prompt action.



4 Proposed guidelines for making buildings earthquake resistant, showed examples of progressive efforts

PROBLEMS

- Buildings not only have to be rebuilt but existing buildings need to be retrofitted.
- Many municipalities have almost no experience reinforcing buildings.

- We developed guidelines and manuals, and showed examples of progressive efforts.
- The presentation of concrete seismic retrofitting methods made it easier to make building reinforcement plans.

Reference

Seismic Retrofitting Quick Reference:

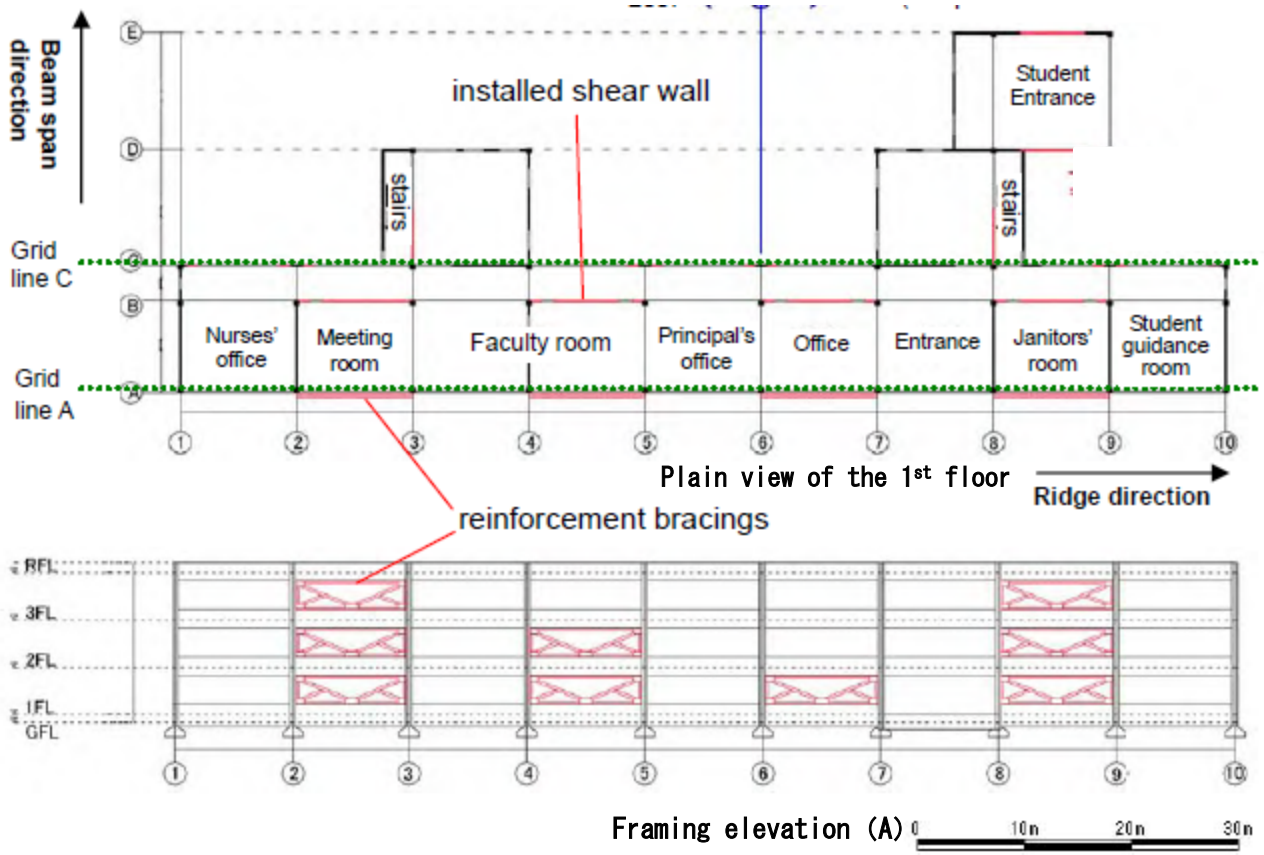
School Facilities that Can Withstand Earthquakes ~ Examples of Seismic Retrofitting ~ (Sept. 2006)

English version can be downloaded from: http://www.nier.go.jp/shisetsu/pdf/e-taishinjirei.pdf

- Shows detailed information on examples of various earthquake reinforcement methods, including cost and period of work.

Steel brace has been added

Shear wall has been added



5 Encouraged decisions by mayors

PROBLEM

- Large cost is required within a short period of time to move forward promptly with earthquake resistance efforts.
- Local governments decide the size of budgets annually for each department. It is difficult for them to secure budgets greatly exceeding past levels.

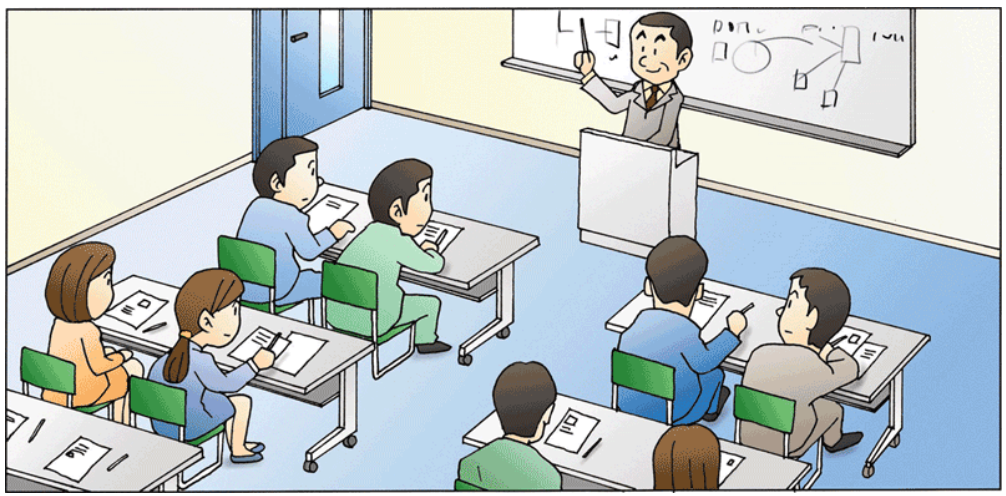
- MEXT directly appealed to mayors the importance of making school facilities earthquake resistant and securing the necessary budgeting through the leadership.

- MEXT Minister wrote directly to mayors to urge prompt action.

6 Provided individual consultation and advice

- MEXT officials visited municipalities to provide specific guidance regarding financial and technical problems.

- Held workshops with the aim of promoting earthquake resistance, and established channels for consultations with experts.



REMAINING CHALLENGES

AFTER THE PROGRAM
FOR EARTHQUAKE-RESISTANT SCHOOL BUILDINGS

Remaining Challenges

① Promotion of earthquake resistance measures for nonstructural elements

② Enhancement of Functioning as Evacuation Shelters

③ Countermeasures against the Deterioration of School Facilities

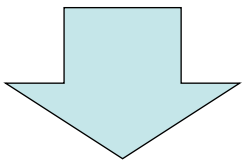
① Promotion of earthquake resistance measures for nonstructural elements

Damage of
the non-structural elements

① Promotion of earthquake resistance measures for nonstructural elements

PROBLEMS

- A great deal of damage was caused to non-structural elements such as falling ceiling materials by the Great East Japan Earthquake.
- While progress was made in reinforcing buildings, the damage to non-structural elements was conspicuous.



- MEXT sets policies, arranges financial schemes, and provides technical guidance in the phase of program design.
- Priority has been given to measures for retrofitting such ceilings.

Further Promotion for Earthquake Resistance Projects to Non-structural Features

Reference 1

Request for promotion of measures to prevent ceilings, etc., from falling in national, public, and private schools (Aug. 2013 & Aug. 2016)

1. Implementation of a thorough inspection for ceilings, etc., in gymnasiums

○ Among school facilities, ceilings in gymnasiums, martial arts halls, auditoriums, and indoor swimming pools (in gymnasiums, etc.) are to be thoroughly inspected if the type of ceiling is any of the following:

① the height is more than 6 m

or

② the horizontal projection area is more than 200 ㎡

The gymnasium's ceiling collapsed

2. Implementation of measures to prevent ceilings, etc., from falling in gymnasiums, etc.

○ Ceilings in the above-mentioned gymnasiums, etc., are to be improved alongside earthquake resistance projects on a priority basis from high-risk ceilings.
Consider measures focusing on removal of ceilings in order to ensure student safety.

○ Take measures such as thermal insulation, acoustic issues, etc., into account in order to not alter the utilization of the facility if such ceilings are removed.

○ Ongoing projects shall be regarded as non-conforming for existing projects at the time of completion of construction. Therefore, design changes, etc., such as not installing ceilings or installation of light weight ceilings, etc., must be considered.

Request to aim to complete the work before fiscal 2015
for national and public schools

Promotion of Earthquake Resistance Projects for Non-structural Features

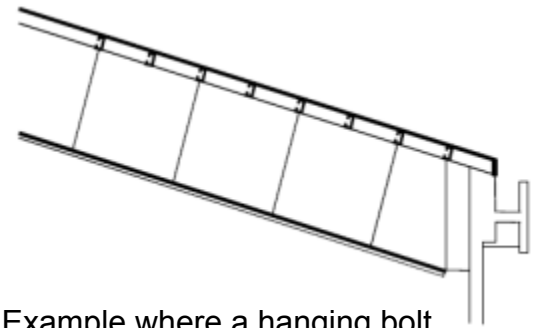
Reference 2

Manual for Measures to Prevent Ceilings, etc., from Falling in School Facilities (August 2013)

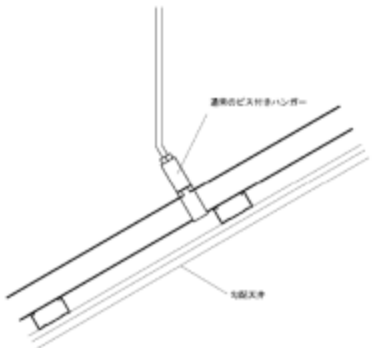
Provide ideas and procedures for inspections and measures to prevent school gymnasium ceilings from falling due to earthquakes

Checklist of direction and length for hanging bolts

Item	Result of confirmation		Material to be confirmed
Direction of hanging bolt	☐Everything is vertically installed	OK	rectangle figure,ceiling basic plan
	☐Some are installed in an oblique direction	Consider removal	
	☐Some hanging bolts are installed with bent		
	☐No material to confirm the condition	Site check	
Length of hanging	☐Less than 3m both XY direction and no hanging bolt is mixed with different length (Length of hanging : m)	OK	
	☐Some hangings exceeds 3m	Consider removal	
	☐Hanging bolts with different length are mixed up	Need Consideration	
	☐No material to confirm the condition	Site check	



Example where a hanging bolt is attached at a slant



Example where a hanging bolt is attached after being bent

Promotion of Earthquake Resistance Projects for Non-structural Features

Reference 3

Collection of examples of measures to prevent gymnasium ceilings, etc., from falling (April 2014) and Supplemental Edition (July 2015)

Show detailed points to consider when taking actual measures:
the review process, outline of measures, cost and work period, for each example

Removal of ceiling

Example where the ceiling is removed

Promotion of Earthquake Resistance Projects for Non-Structural Features

Reference 4

Guidebook for Earthquake Protection for Non-structural Features of School Facilities
(Revised Edition / Mar. 2015)

English version can be downloaded from : http://www.nier.go.jp/shisetsu/pdf/e-gijyutsu2.pdf

Describes the contents and methods of inspections and measures in a simple way for school teachers and administrators

◆Examples of inspection items done by school teachers

Are racks and lockers fixed to walls or floors with metal fittings?

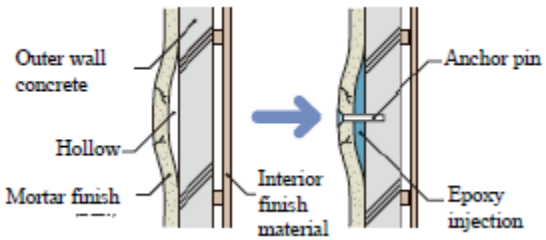
Example where racks are combined and attached together.

Example where the bottom of a rack is attached to the floor

◆Examples of inspection items done by school establishers

Is there any flaking, chipping, cracking, or floating?

Flaking of mortar

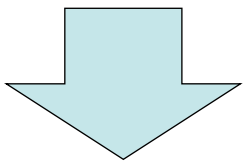


Floating of mortar and example of countermeasure

② Enhancement of the Functioning as Evacuation Shelters

PROBLEMS

- 90% of public schools have been designated as evacuation shelters.
  But they do not function adequately enough.
- It is difficult to prepare facilities and equipment necessary for a shelter after the occurrence of a disaster.



- MEXT prepared a guidebook to show the necessary functions required.
- MEXT subsidizes necessary costs for enhancing school's disaster prevention functions.

Reference 1

Ideal State of Disaster-resilient School Facilities

~ Tsunami protection measures and enhancement of disaster functioning as evacuation shelter ~ (Mar. 2014)

English version can be downloaded from : http://www.nier.go.jp/shisetsu/pdf/e-disaster-resilient.pdf

Necessary functions for school facilities which can be utilized as evacuation shelters

Earthquake protection, fire resistance, barrier-free environment, thermal insulation

* Improvement of these basic functions for school facilities is important also for strengthening of their function as a shelter.

Information communication

* It is important to develop reception equipment for disaster management administration radio communications and the school broadcasting system in preparation for power failure, etc. in order to obtain disaster information and communicate it at the school during the lifesaving/evacuation stage
* It is important to develop radio equipment capable of intercommunication for communication with the town (village) office, etc.

Stockpile warehouse

* It is important to secure a stockpile according to the assumed number of evacuees in a place safe from disasters

Slope

Stockpile warehouse

Strengthening of Function as Evacuation Shelters

Electricity, gas

* It is important to store portable generators, etc. to secure power for lighting and other equipment. It is desirable to install photovoltaic power generation equipment capable of self-sustaining operation.
* It is important to secure LP gas, portable gas stove, etc. as a heat source for cooking because the existing heat source may become unusable.

Toilet

* It is important to secure the necessary number of toilets in combination with multiple types including manhole toilet and portable toilet assuming water outage and other situations.
* It is effective to install piping and pumps to use swimming pool water for flushing ordinary toilets and manhole toilets.

Photovoltaic power generation equipment capable of self-sustaining operation

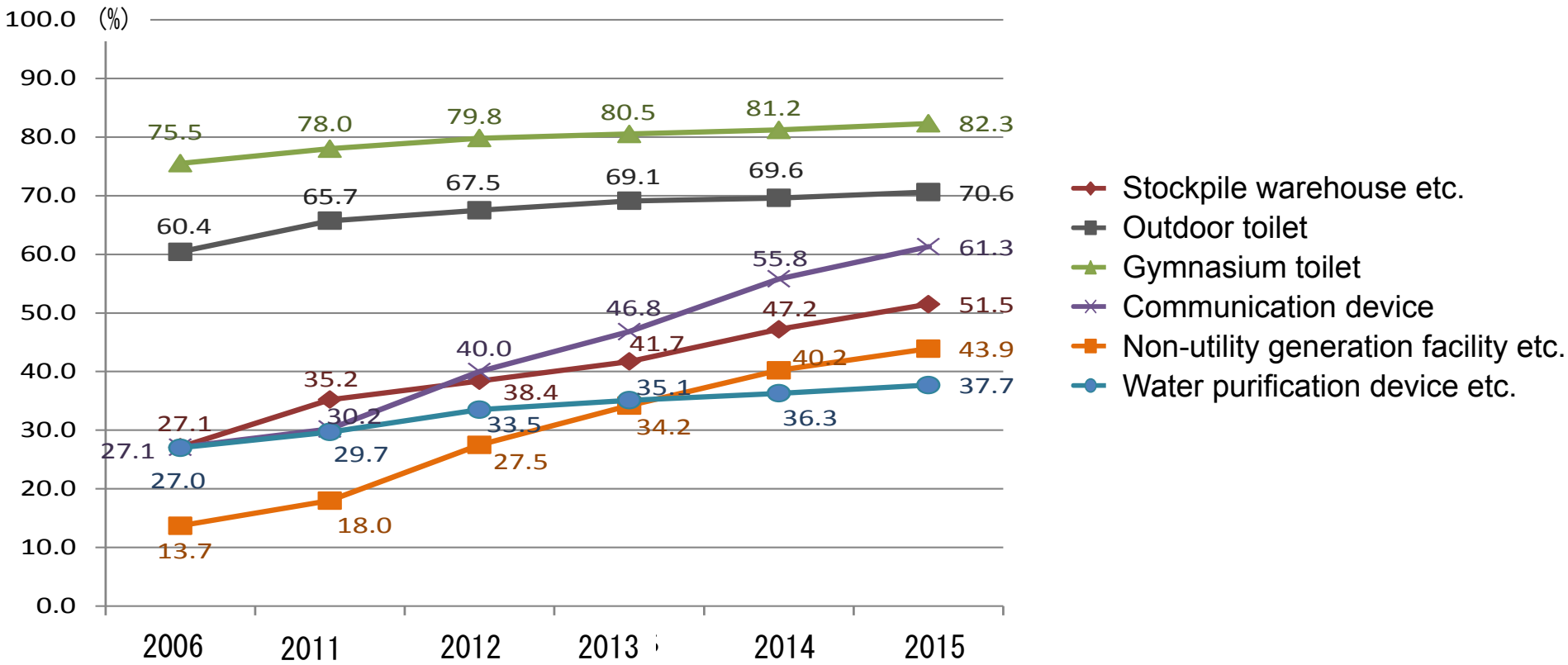
Installation of large water-collecting tank

Installation of faucets to an water receiving tank

Enhancement of Function as Evacuation Shelters

Reference 2

Changes in installation ratio of disaster management facilities and equipment at school



National government subsidy pertaining to the enhancement of functioning as evacuation shelters

- Disaster management enhancement project
  Subsidy for installation of stockpile warehouses, freshwater tanks, fire cisterns, wells, and outdoor toilets as well as a non-utility generation facility. Target: public schools, Subsidy rate:1/3

The 2016 Kumamoto Earthquake

- 14 April 2016 21:26
- Magnitude 6.5
  (*shindo*/seismic intensity: 7)

- 16 April 2016 1:25
- Magnitude 7.3
  (*shindo*/seismic intensity: 7)

- Over 2000 times of aftershocks had followed

- Number of deaths and missing:
  49 people
- Damage to school facilities:
  942 buildings

The corridor's ceiling collapsed

The gymnasium's ceiling collapsed

Year 2016 MEXT's Activities at Post-Kumamoto Earthquake

April 16, 2016　Kumamoto Earthquake

July 13, 2016

A committee was established to advanced the discussion on the following topics:

1. Validating the existing schools facilities against disaster risks, considering the damages to school buildings and experience served as evacuation centers
2. Examining the key issues for enhancement of school facilities

July 28, 2016

"Post-Kumamoto Earthquake: Urgent Recommendation for School Facility Improvement"

Committee Members

- Experts on **School building design**
- Experts on **Structural engineering**
  Experts on **non-structural elements** of buildings
- Experts on **Disaster Preparedness**
- **Local government** officials (different size of governments)
- **MEXT** officials (secretariat)

Advance the implementation of measures
to improve the disaster resilience of school facilities.

③ Countermeasures against the Deterioration of Facilities

PROBLEMS

- Increasing number of facilities are facing deterioration.
- Under the severe fiscal conditions, it is necessary to shift from reconstruction to major refurbishment to expand lifespans of school facilities.

External wall’s mortar fell down due to aging

Clogged and smelly toilets due to aging

Pipe is broken due to deterioration

Refurbishment work to prolong life duration of school facilities

- Methods for leaving columns and beams but refurbishing any parts such as pipes or interior and exterior fittings.
- Possibly secure an education environment equivalent to reconstruction while reducing costs.

- If refurbishment work to prolong the life of the building is done at the appropriate time, the building can continuously be used more than 30 years after the refurbishment.

English version can be downloaded from ： http://www.nier.go.jp/shisetsu/pdf/e-lifespanextention.pdf

Before refurbishment

After refurbishment

Before refurbishment

After refurbishment

(Reference)
Ministry of Education, Culture, Sports, Science, and Technology

1871　Ministry of Education established

1968　Agency for Cultural Affairs established

1956　Science and Technology Agency established

2001　Ministry of Education, Culture, Sports, Science, and Technology (MEXT) established
（merging of the Ministry of Education and the Science and Technology Agency)

2015　Japan Sports Agency established