Countermeasures against the Deterioration of School Facilities

Promotion of the Lifespan Extension of School Facilities

March 2013

Committee for Research Studies on the Visions of School Facilities

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Introduction

We are currently facing a new crisis: the large wave of school facilities with deterioration.

It is no exaggeration to say that Japan is facing this kind of issue for the first time. From the 1970s to the early 1980s, many school facilities were constructed throughout Japan, as the second baby-boomer generation was increasing. However, with both national and local governments currently facing severe financial conditions, these facilities are entering a period of necessary renewal. On the other hand, we must also address the ongoing problem of the aging society with fewer children. There is virtually no time to waste in taking some measures for both these issues, and we should recognize that Japan must face these major problems.

These issues involve school, where children who will lead the future learn and lead their day-to-day lives. We must never allow the problem of facilities with deterioration to be left unaddressed, and one day the problem will reach a point where there is no way to resolve it. The large waves of deterioration arrive one after another incessantly, and can not be resolved with makeshift countermeasures. With the debts of national and local governments growing largely, there is no leeway to postpone the problem of facilities with deterioration to the next generation. We must display the attitude of resolving the problem now, within our generation. In order to do so, we must change the awareness of not only the national and local governments, but also that of parents, regional residents, and designers and constructors related to school facilities.

We have decided on this occasion to address this inevitable issue of taking countermeasures against the deterioration of facilities head-on, under the severe fiscal conditions of both national and local governments. Consequently, for the last one year, we have been repeating discussions with the strong awareness that this is the largest national project related to school facilities.

The interim summary compiled in August 2012 shows the measures that the national and local governments should take, mainly for public elementary schools and lower secondary schools, from the perspective of improving the quality of the educational environment, ensuring safety and assurance, and considering fiscal matters. On this occasion, these measures are further considered, and the future directions of countermeasures against the deterioration of school facilities are compiled as Part I: The Vision of Countermeasures Against the Deterioration of School Facilities, and also examples of advanced efforts that serve as a reference for local governments to take countermeasures against the deterioration of facilities are introduced in Part II.

School facilities are themselves one of the important elements that are essential for education. That is why we would like to convey the message to the children who bear the future that it is important to continue using what exists now carefully, by carrying forward the lifespan extension measures that are mentioned in this report. We would also like to trigger the creation of a sustainable society.

We sincerely hope that this report will stir up the consideration of countermeasures against the deterioration of facilities by the national government and local governments in the future.

March 2013

Part 1: The Vision of Countermeasures against the Deterioration of School Facilities

Chapter 1: Current Situation Surrounding School Facilities and Problems Thereof

1. Roles of school facilities

(1) Space for children's studying and living

School facilities are spaces for children's studying and living, and are a part of the basic educational conditions for implementing school education activities.

Therefore, functional facility environment wherein enhanced educational activities can be fully implemented should be provided. At the same time, the facility must be comfortable, safe and assuring, with a sufficiently safe, disaster-preventive, and sanitary environment being ensured.

(2) Base for Regional Communities and Disaster Prevention

School facilities are not only educational facilities for children but also the most familiar facilities for regional residents. They serve an important role as spaces for lifelong learning and cultural and sports activities, and also as a regional disaster prevention bases used as emergency evacuation centers at the time of disasters, such as earthquakes.

Therefore, the promotion of collaboration with other educational facilities or elderly welfare facilities, and the enhancement of the function of facilities as a disaster prevention base, should be carried forward as needed. At the same time, consideration should be made so that the facilities are accessible not only for students and teachers, but also for parents, local residents, etc.

(3) Facility that accounts for about 40% of the entire public facilities

School facilities make up a large percentage of all public facilities owned or managed by municipalities, accounting for about 40% (Figure 1).

Therefore, the promotion of measures in school facilities is also expected to have a ripple effect on other public facilities, such as citizens' public halls, welfare facilities, and social physical education facilities.

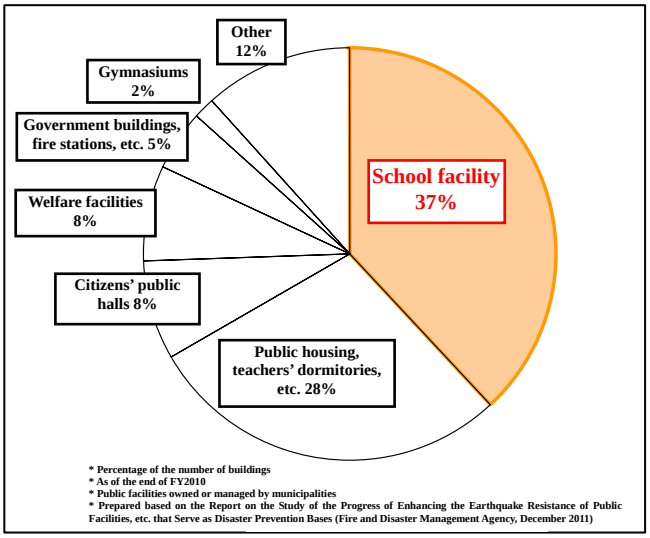

Figure 1: Percentage of school facilities among all public facilities

2. Current situation of school facilities

(1) Situation surrounding schools

The number of elementary and lower secondary school students peaked after World War II, with the number of elementary school students reaching approximately 13.49 million in 1958 and that of lower secondary school students reaching approximately 7.33 million in 1962. Then, from after around the late 1970s until the late 1980s, when the second baby-boomer generation enrolled[1], the trend turned to a constant decrease. As of FY2012, the number of students is almost half of the peak: approximately 6.76 million for elementary school and approximately 3.55 million for lower secondary school. It is expected that the number will decrease further.[2,3] (Figure 2)

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[1] Baby boom is a phenomenon where the number of births temporarily shows a rapid increase. There were two baby booms in Japan after World War II. The first baby boom was from 1947 to 1949, and the second was from 1971 to 1974. (From The White Paper on Children and Child-Rearing, FY2011)

[2] According to the Population Projections for Japan (January 2012) by the National Institute of Population and Social Security Research, the population of the younger generation (under 15 years old) is forecasted to decrease from 16.84 million in 2010 to 7.91 in 2060, a decrease of 8.93 million (53.0% of the total population in question) (medium-fertility [medium-mortality] scenario).

There were about 41,000 schools (total of elementary and lower secondary schools) by around 1955. Later, the number remained generally unchanged from around 1965 to early 1990s, at around 36,000. Then, as more and more schools closed, and the number decreased from 36,030 (1992) to 32,159 (2012), showing a decrease of about 10% in the last 20 years (Figure 2).

On the other hand, the area of school facilities has been increasing in line with the increase in the number of students and the advancement and diversification of the functions of school facilities after the war. However, the area has remained generally unchanged or only slightly decreasing in recent years. The retention area of public elementary and lower secondary school facilities as of FY2010 is 163.22 million m^2 (Figure 3), and the ratio to the required area[4] is about 102% for elementary school buildings and about 110% for lower secondary school buildings.

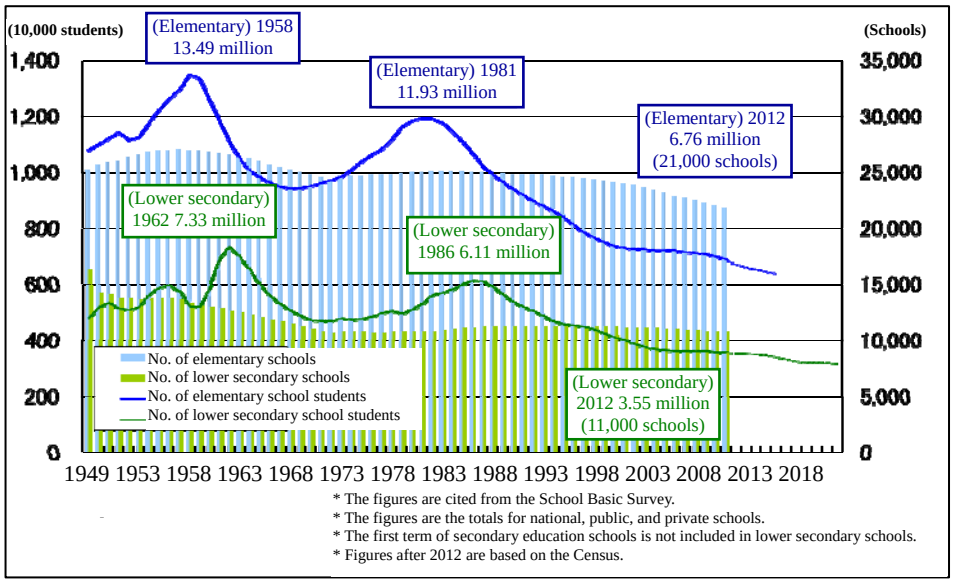


Figure 2: Changes in the number of elementary and lower secondary schools and the number of students

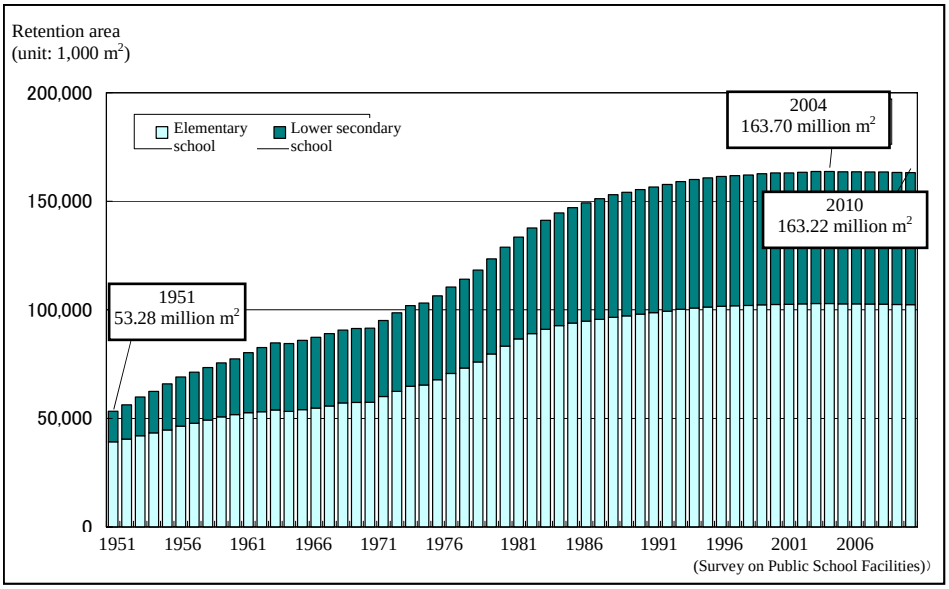


Figure 3: Changes in the retention area of public elementary and lower secondary school facilities

[3] It is also necessary to pay attention to the increasing trend of the number of students in certain regions and in schools for special needs education.

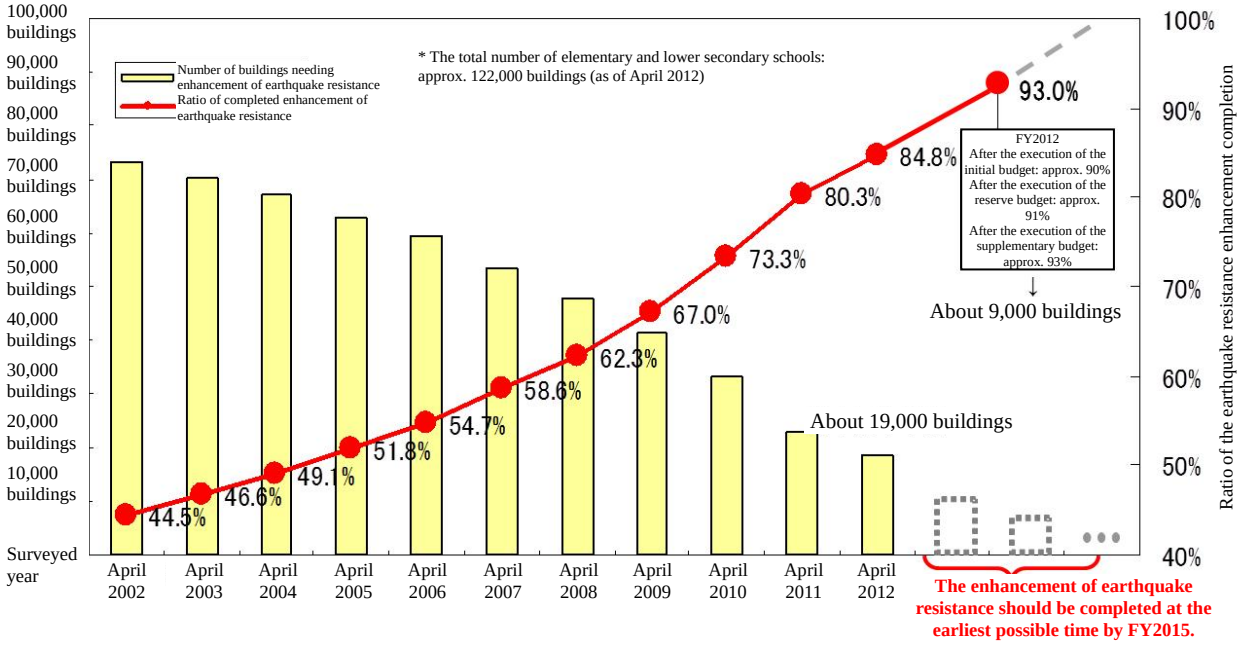
[4] Required area is the standard area necessary for ensuring the implementation of school education according to the Course of Study set forth by the type of school and type of building. It does not specify the area of individual rooms, such as classrooms, but sets forth the total area according to the size of the school, so that each school establisher may prepare various school facilities flexibly. In addition, the requirements of required area are being improved based on the revision of the Course of Study, in response to the diversification of the details and methods of education.

(2) Progress in the enhancement of earthquake resistance

In the Great East Japan Earthquake that occurred in March 2011, many school facilities not only protected the lives of children, but also worked as evacuation centers. A school is the center of the local community, and also serves the role of a disaster prevention base. Therefore, the promotion of enhancing schools' earthquake resistance is crucial.

The ratio of the earthquake resistance enhancement completion in public elementary and lower secondary school facilities is 84.8% as of April 2012. While the ratio increases to about 93% with the FY2012 budget (including both the reserve budget and supplementary budget), about 9,000 facilities remain without earthquake resistance (Figure 4). The Basic Principles on the Development of the Facilities of Public Compulsory-Education Schools (Public Notice No. 61 by the Ministry of Ministry of Education, Culture, Sports, Science and Technology of 2006) based on Article 11 of the Act on National Treasury's Sharing of Expenses for Facilities of Compulsory Education Schools, etc. (Act No. 81 of 1958) sets forth that the enhancement of earthquake resistance should be completed at the earliest possible time by FY2015. Therefore, the implementation of enhancement is of the highest priority.

On the other hand, the ratio of local governments that have completed the enhancement of earthquake resistance accounts for about 40% of all local governments, and is expected to increase in FY2013 and thereafter. Local governments need to cope with new issues, such as earthquake resistance enhancement measures for non-structural parts and materials, and countermeasures against the deterioration of facilities.



(Prepared based on the Study of the Enhancement Refurbishment of the Earthquake Resistance of Public School Facilities)

Figure 4: Progress in the enhancement of earthquake resistance (public elementary and lower secondary schools)

(3) Response to various issues

The Great East Japan Earthquake caused extensive damage to non-structural parts and materials in many school facilities, including the falling of ceiling materials, lighting apparatuses, and exterior materials. Some caused human damage, such as injuries due to falling non-structural parts and materials. There were also situations where the school facility could not provide a safe and secure environment as an emergency evacuation center. Thus, the importance of enhancing the earthquake resistance of non-structural parts and materials is being reaffirmed. As of May 2012, the implementation ratio of earthquake resistance enhancement measures for non-structural parts and materials in public elementary and lower secondary schools remains at 32.0%, so it is necessary to take countermeasures promptly from now on (Figure 5).

While about 90% of public elementary and lower secondary schools are designated as an evacuation center, currently the disaster prevention functions of some of these facilities are insufficient. According to the study implemented by the National Institute for Educational Policy Research, as of May 2012, the establishment ratio of toilets in gymnasiums was 79.8%, and the ratio of toilets that can be used from outside the building was 67.5%. Similarly, the establishment ratios of disaster prevention and storage warehouses, facilities to secure water such as water purification devices for water tanks and pools, in-house power generation systems, and emergency communication devices remain, respectively, at 38.4%, 33.5%, 27.5% and 40.0% (Figure 6).

Further, it is necessary to promote the diffusion of environmentally-friendly facilities (eco-schools) in order to cope with environmental issues, including global warming, and to improve the quality of the educational environment in order to adequately respond to various social requirements, such as changes in the content and method of education, use of ICT in education, and the promotion of barrier-free access to facilities. In addition, it is also an important issue to promote facility development through measures such as the creation of complex facilities or increased shared use of social education facilities and welfare facilities, such as citizen's public hall, in order to contribute to the enrichment of student' school educational activities or the strengthening of collaboration between the regional community and the school.

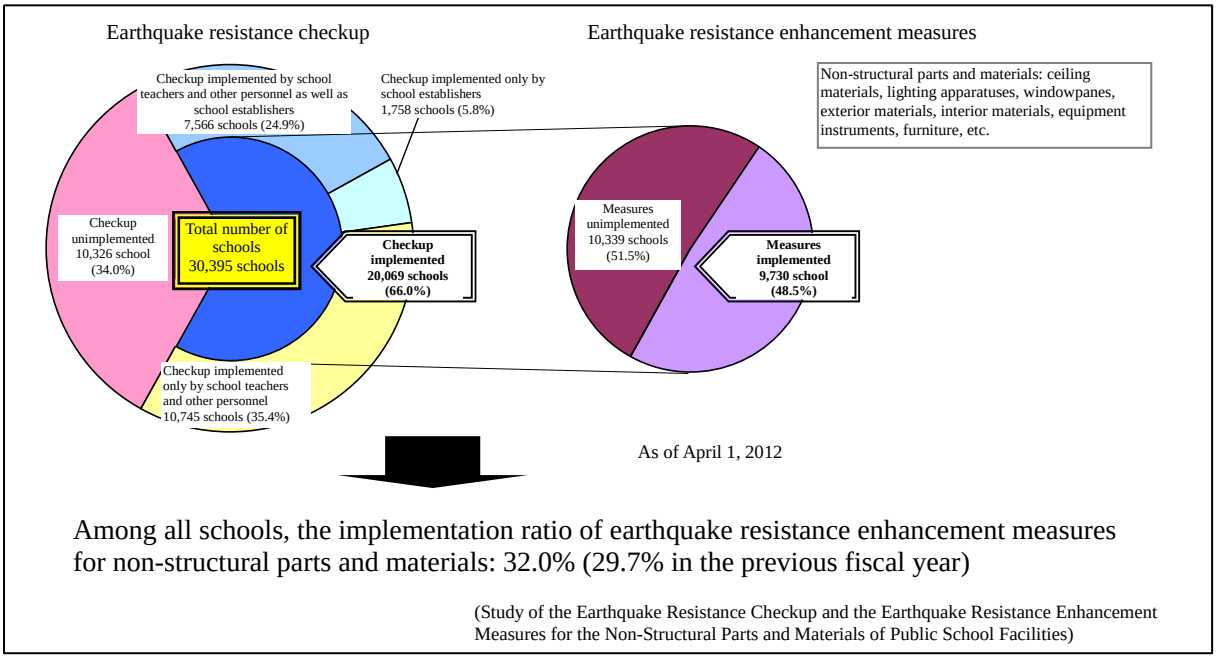


Figure 5: Earthquake resistance checkup and countermeasures of non-structural parts and materials (public elementary and lower secondary schools)

Item	Municipal schools			Prefectural schools						Total		
				Upper secondary schools			Schools for special needs education					
	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)
Disaster prevention and storage warehouses (within the school grounds)		11,731	39.7		599	24.2		84	30.5		12,414	38.4 (35.2)
Disaster prevention and storage warehouses (including those outside the school grounds)		14,392	48.7		639	25.8		86	31.3		15,117	46.8 –
Toilets that can be accessed from outside the building		19,793	66.9		1,887	76.2		150	54.5		21,830	67.5 (65.7)
Toilets in gymnasiums		23,941	80.9		1,676	67.6		193	70.2		25,810	79.8 (78.0)
Multipurpose toilets in gymnasiums		5,660	19.1		433	17.5		101	36.7		6,194	19.2 –
Multipurpose toilets in school buildings		12,193	41.2		1,291	52.1		203	73.8		13,687	42.3 –
Communication devices	29,580	12,327	41.7	2,478	532	21.5	275	71	25.8	32,333	12,930	40.0 (30.2)
In-house power generation systems, etc. *		7,830	26.5		863	34.8		206	74.9		8,899	27.5 (18.0)
Water purification devices for water tanks and pools, wells		9,888	33.4		852	34.4		98	35.6		10,838	33.5 (29.7)
Spaces for those in need of special help		10,216	34.5		1,163	46.9		140	50.9		11,519	35.6 –
Spaces considering privacy for women		9,836	33.3		1,041	42.0		123	44.7		11,000	34.0 –
Wheelchair ramps in gymnasiums		12,753	43.1		911	36.8		170	61.8		13,834	42.8 –
Wheelchair ramps in school buildings		14,489	49.0		1,412	57.0		201	73.1		16,102	49.8 –

Based on the survey by the National Institute for Educational Policy Research (as of May 1, 2012)

Figure 6: Preparation of disaster-prevention facilities and equipment of school facilities designated as evacuation centers

(4) Present State of Facilities with Deterioration

i. Increase in the number of facilities with deterioration

Many of the public elementary and lower secondary school facilities were established concurrently with the rapid rise in the number of students from the late 1970s to the early 1980s. Among the facilities not made of wood, with a total area of approximately 150 million m^2, the total area of facilities that are 25 years old or older accounts for approximately 110 million m^2, which is about 70% of the total. Among them, the area of facilities with deterioration where refurbishment is necessary is approximately 100 million m^2.[5] The area of facilities that are 25 years old or older accounts for about 90%, and the area of facilities already refurbished remains at approximately 10 million m^2 (Figure 7).[6]

As seen so far, while the earthquake resistance of school facilities has been enhanced, the progress of countermeasures against deterioration remains insufficient, and it is expected that demand for refurbishment/ reconstruction will increase in the future. Actually, the number of public elementary and lower secondary school facilities that are 30 years old or older, for which serious deterioration is a concern, is increasing every year, and whereas the percentage of such facilities was 19.8% in FY2000, it increased significantly to 53.5% in FY2010. It is expected that the number of these facilities will further increase in the future, and account for 66.5% in FY2015.

The average age of school facilities that were reconstructed in FY2011 was about 42 years (Figure 8) in the case of reinforced concrete buildings. This shows that facilities constructed by around 1969 are now being reconstructed. Because more than 30 million m^2 of school facilities have been developed in the period from 1977 to 1981, countermeasures against deterioration are a pressing issue and it is also expected that they require considerable expenses.

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[5] These include facilities for which the refurbishment is partly finished or unimplemented. “Unimplemented” means that almost no refurbishment is implemented for the interior, exterior or equipment, or that refurbishment was implemented in the past but a full-scale refurbishment is currently necessary due to deterioration. “Refurbishment partly finished” means that the refurbishment for the interior, exterior and equipment is implemented only partly and further refurbishment by local governments is necessary, or that refurbishment was implemented in the past but a partial refurbishment is currently necessary due to deterioration.

[6] Refer to p.103 for retention areas by the age of the building. (Not included in English version of this report)

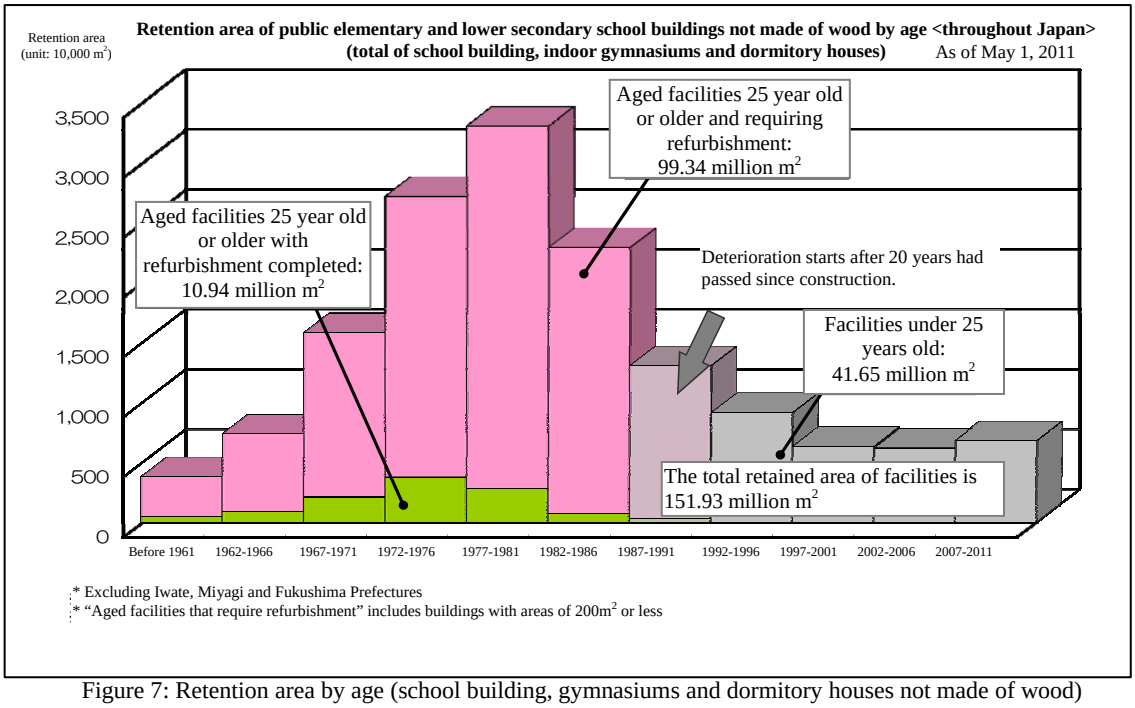


Figure 7: Retention area by age (school building, gymnasiums and dormitory houses not made of wood)

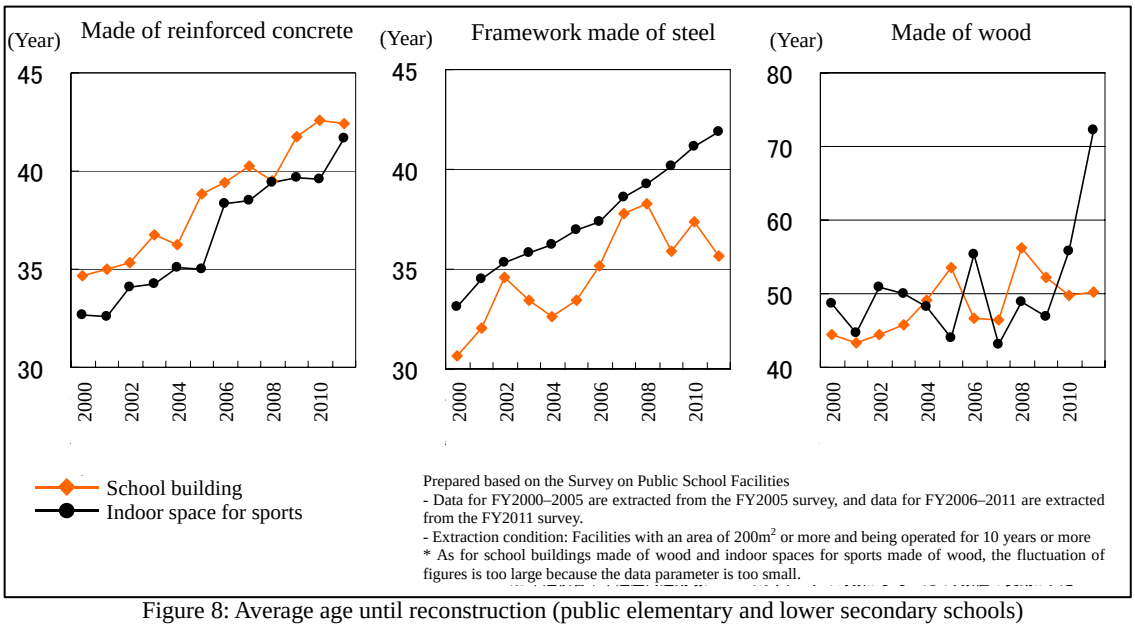


Figure 8: Average age until reconstruction (public elementary and lower secondary schools)

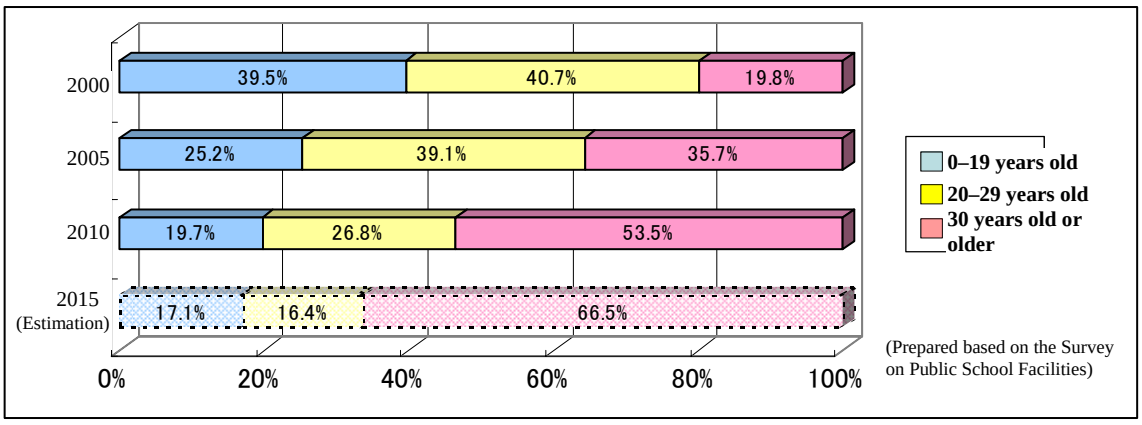


Figure 9: Changes in the ratio of retention area by age (public elementary and lower secondary school)

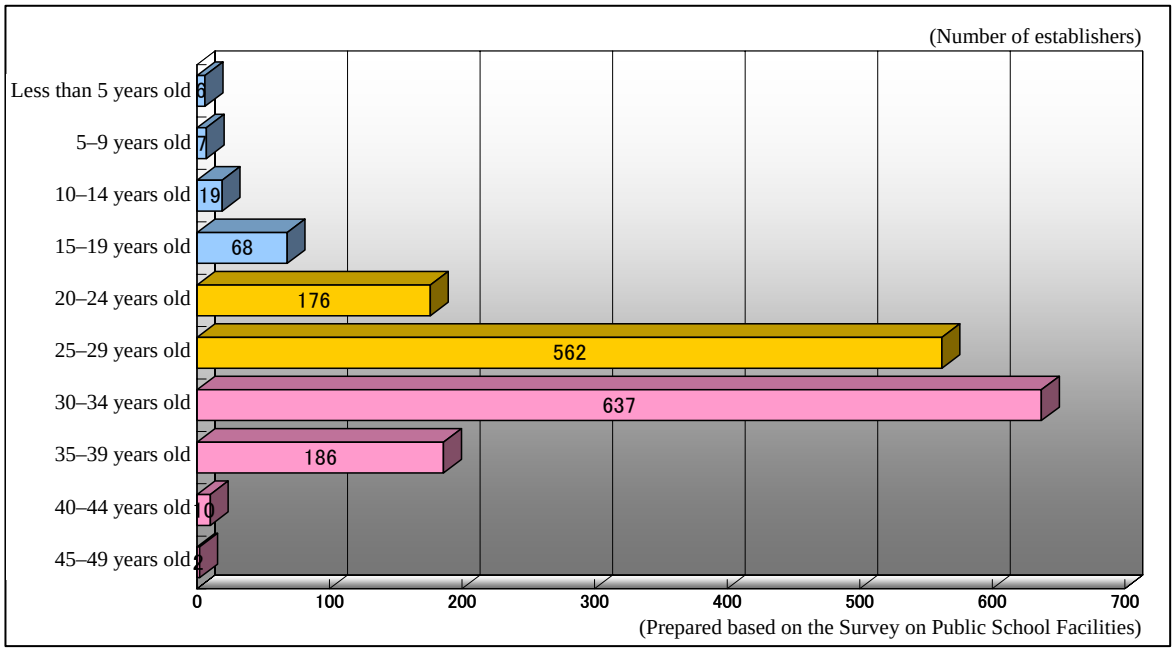


Figure 10: Distribution of average ages of establishers

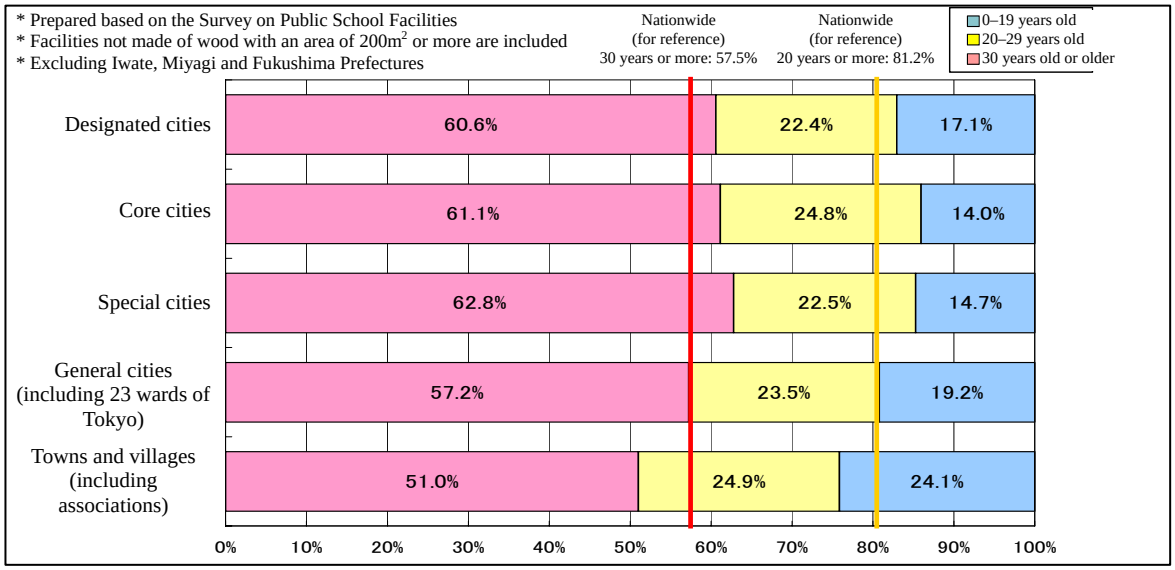


Figure 11: Retention area by age (by categorization of municipality)

ii. By establishers

When viewed by establisher, about half of all establishers have public elementary and lower secondary school facilities with an average age of 30 years or more. Added to the ratio of establishers whose facilities are 25 to 29 years old on average, the percentage exceeds 80% of the total (Figure 10). This shows that many establishers possess aged school facilities.

By prefecture, the percentage of facilities that are 30 years old or older tends to be high in large city areas, including Tokyo, Osaka and Aichi Prefectures. When viewed by the size of the local government, the ratio of facilities that are 30 years old or older is 51.0% among towns and villages, 57.2% among general cities, and 60.6% among designated cities. There is no large difference in the trend among municipalities of different sizes, from towns and villages to designated cities (Figure 11), indicating that countermeasures against the deterioration of school facilities is a nationwide issue.

iii. Maintenance and management

While the number of facilities with deterioration is increasing, expenses for the maintenance and management of facilities paid by local governments have been decreasing recently, suggesting that sufficient countermeasures are not being taken. To be specific, the area of aged facilities that are 30 years old or older has increased ten-fold in the last 20 years, and although maintenance and management should be implemented accordingly, adequate measures have not been taken by local governments, and repair expenses[7] have been decreasing over the last 20 years (Figure 12). It is expected that maintenance and management expenses will increase significantly in the future.

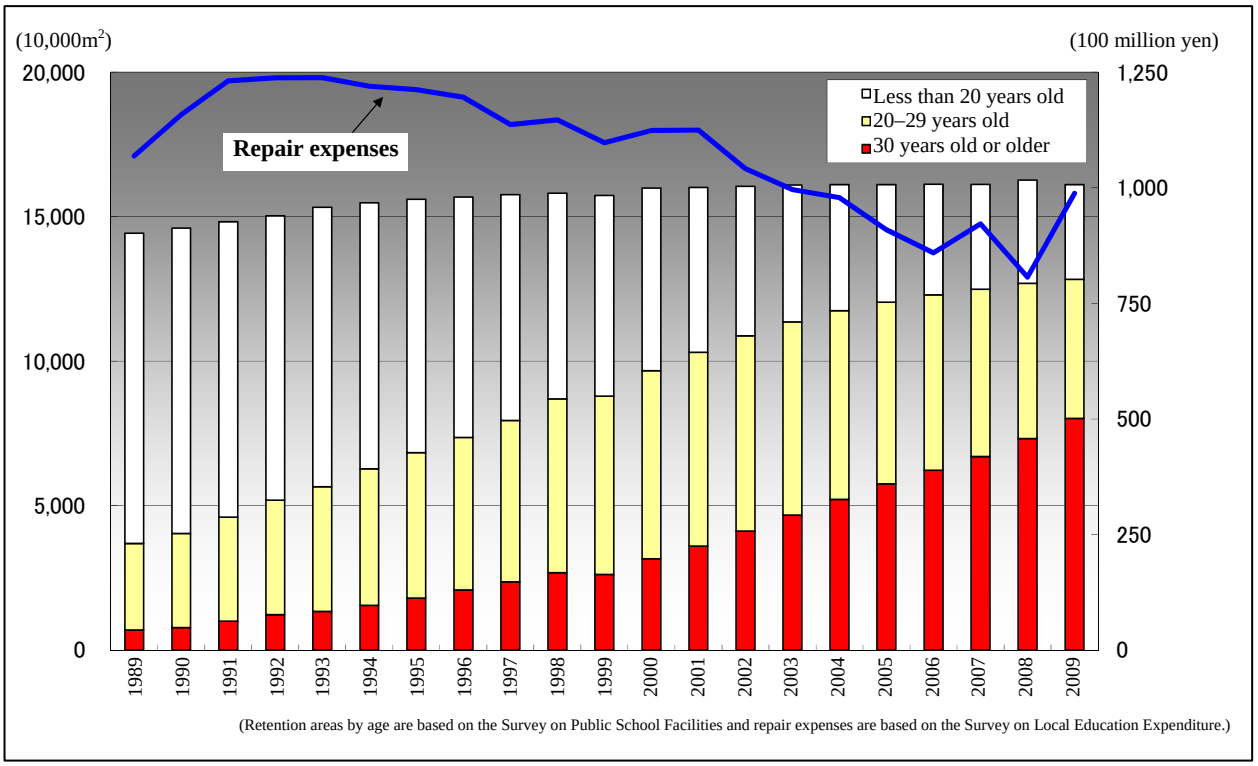


Figure 12: Changes in retention area by age and repair expenses (public elementary and lower secondary schools)

(5) Recognition by local governments

Upon the consideration for this report, the Ministry of Education, Culture, Sports, Science and Technology implemented the Questionnaire Survey on the Consideration of Countermeasures against the Deterioration of Public School Facilities (hereinafter referred to as the "questionnaire survey") from May to June 2012, on the heads of the department of the board of education in each municipality that is mainly in charge of facilities, in order to understand the current situation of the deterioration of public elementary and lower secondary school facilities and efforts taken by local governments.

The questionnaire survey collected responses from 1,663 municipalities among the 1,666 surveyed municipalities (local governments wherein the submission of responses is difficult due to the impact of the Great East Japan Earthquake and local governments that do not possess public elementary and lower secondary school facilities that are 25 years old or older are excluded) (respondent ratio: 99.8%).

As a result of the questionnaire survey, regarding the opinions on school facilities currently possessed, many

[7] Repair expenses are expenses required for repairs that were necessary for maintaining the utility of facilities (labor costs, costs of raw materials, contracting cost, etc.). The repairs include, for instance, the replacement of damaged floor parts, repainting, and the repair of roofs and windowpanes. (Survey on Local Education Expenditure)

responded that the earthquake resistance, size, and utilization of ICT and of spare classrooms are sufficient or satisfactory. Particularly regarding the earthquake resistance of facilities, already many municipalities are engaged in measures to enhance earthquake resistance, and about 80% responded their measures are either sufficient or satisfactory. On the other hand, there were many answers noting that countermeasures against deterioration, earthquake resistance of non-structural parts and materials, environmental functions, promotion of barrier-free access to facilities, the thermal environment, and the disaster-prevention function are insufficient or somewhat insufficient (Figure 13). Among them, about 70% of municipalities responded that countermeasures against deterioration are either insufficient or somewhat insufficient.

Further, as for the issue in terms of school facilities development that is considered as especially important in the future, the responding municipalities' top three priority issues were "renewal of facilities with deterioration", selected by 1,231 municipalities (74.0%), "enhancement of the earthquake resistance of buildings and non-structural parts and materials," selected by 1,200 municipalities (72.1%), and "enhancement of disaster-prevention function," selected by 768 municipalities (46.2%) (Figure 14).

Thus, the results of the questionnaire survey confirm that municipalities also recognize the importance of countermeasures against deterioration and measures to enhance the earthquake resistance of non-structural parts and materials.

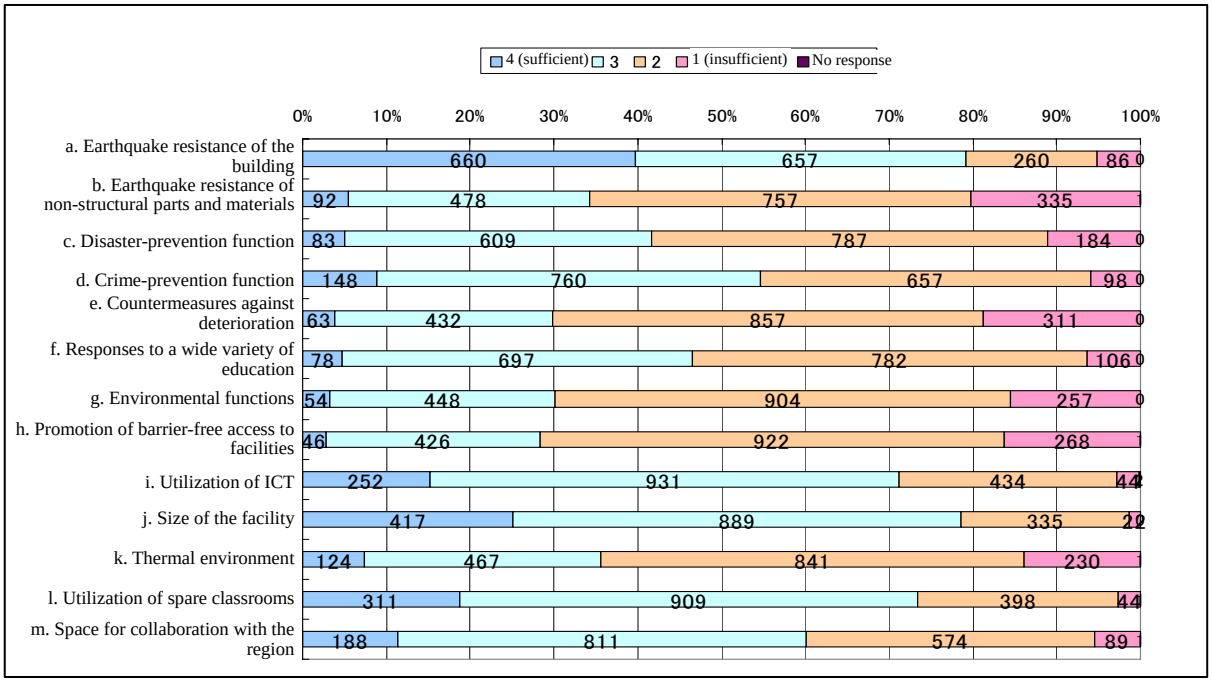


Figure 13: Opinions on school facilities currently possessed (questionnaire survey)

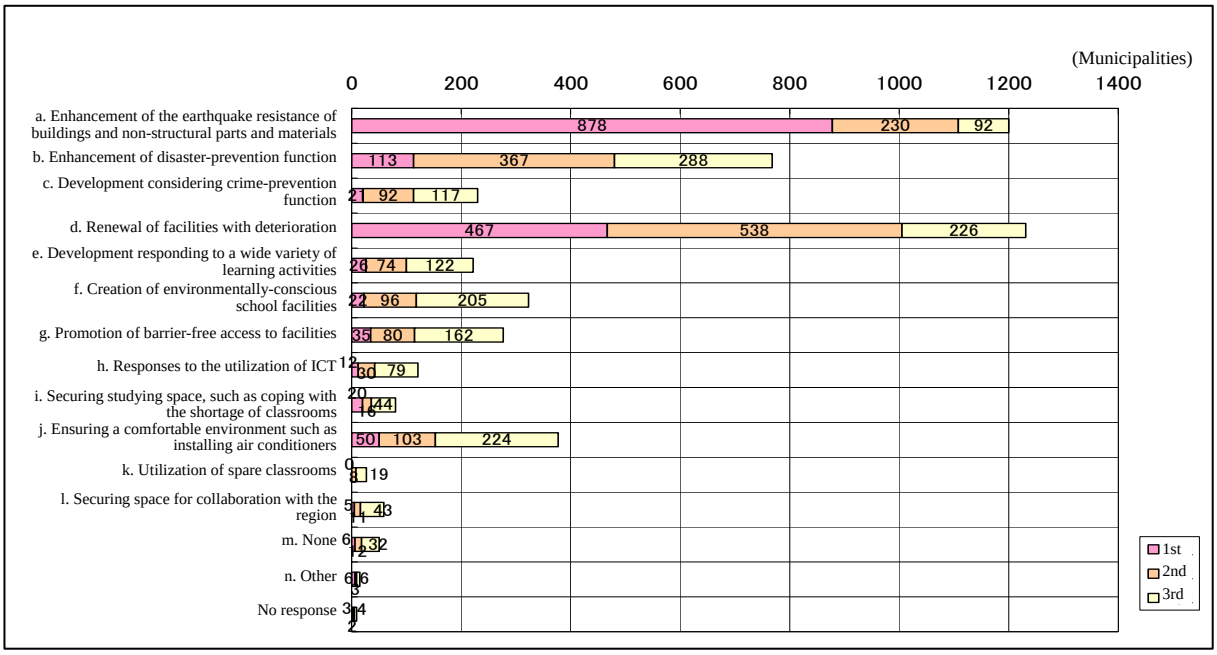
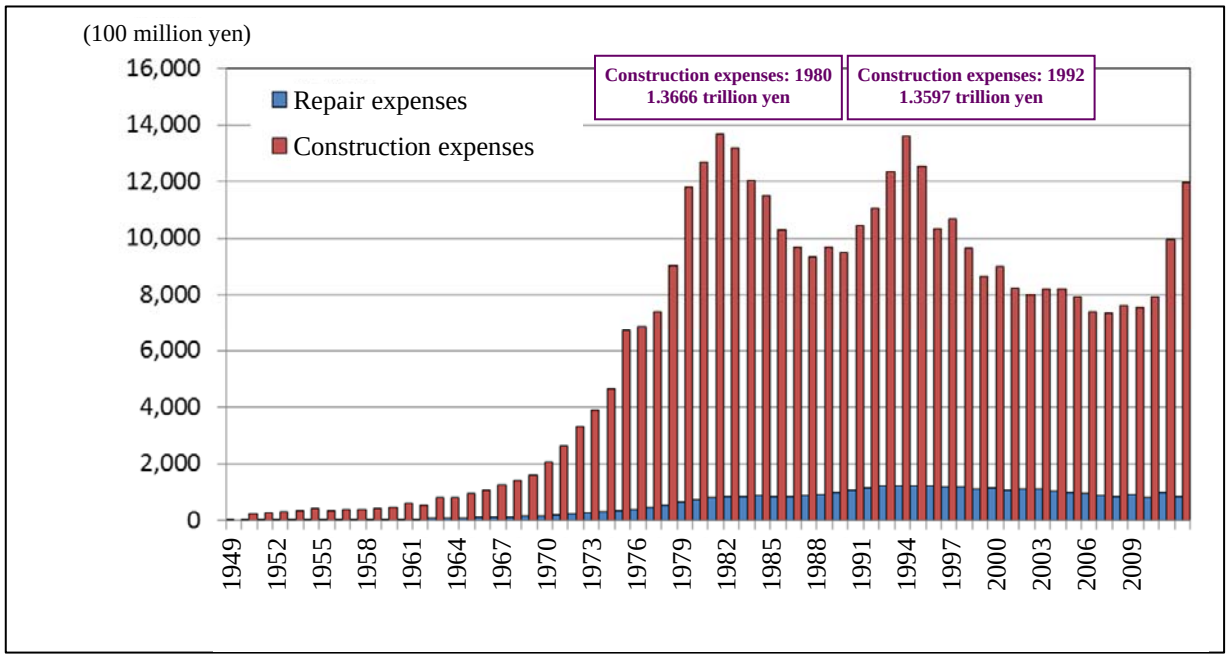


Figure 14: School facilities development that is considered as especially important in the future (questionnaire survey)

(6) Changes in construction expenses

Construction expenses[8] that reached a peak of more than 1.2 trillion yen about 20 to 30 years ago have recently been maintaining the level of about 800 billion yen (Figure 15). With school facilities constructed in the peak period entering the timing for renewal in the future, the number of deteriorated school facilities will increase even further, making it necessary to develop them efficiently and effectively.



(Prepared based on the Survey on Local Education Expenditure)

Figure 15: Changes in the construction and repair expenses of public elementary and lower secondary schools

(7) Severe financial conditions of national and local governments

Japan's financial circumstances have been constantly in a state of expenditure largely exceeding revenues, including tax revenue. The accumulative long-term debt[9] of national and local governments was about 250 trillion yen as of the end of FY1989, about 60% of the GDP. However, it has increased every year, reaching 940 trillion yen, about 196% of GDP, as of the end of FY2012. With severe fiscal conditions expected to continue in the future for both national and local governments, it is necessary to fully consider efficiency when implementing countermeasures against the deterioration of school facilities.

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[8] Construction expenses are expenses for improving the shape or the structure of the facility, including the new construction and reconstruction. They include expenses for the new construction, extension, reconstruction, relocation, remodeling (change of use), etc. of school buildings, gymnasiums, etc.

[9] Accumulative long-term debt is the long-term debt for which interest payment and reimbursement (principal redemption) are mainly covered by tax revenue, accumulated for both national and local governments. Short-term debts for financing and investment-and-loan bonds for which interest payment and reimbursement are covered by the collection of loans are not included. (From the website of the Ministry of Finance)

3. Necessity of countermeasures against deterioration

(1) Safety issues

The aging degradation of parts and materials causes safety problems, such as falling outer walls and windows, and deteriorating structural strength due to reinforcement corrosion and concrete degradation. Degradation of equipment and piping for gas, water and electricity may cause threats to safety, in addition to function

Because these problems cannot be prevented by simply ensuring structural earthquake resistance, separate measures will be necessary.

According to the questionnaire survey, there were about 14,000 cases in FY2011 where buildings were damaged due to aging and mortar, tiles, windows and other things falling off (Figure 16). This means that one safety problem is occurring at one out of every two public elementary and lower secondary schools every year on average.

Because about 90% of public elementary and lower secondary schools are designated as an emergency evacuation center, not to mention the necessity of securing the safety of children, it is necessary to take prompt countermeasures from the perspective of enhancing the regional disaster prevention function.

A railing has fallen due to deterioration

(2) Functional issue

Measures to enhance structural earthquake resistance have been recently taken in many school facilities. On the other hand, the functions of facilities have not been necessarily improved sufficiently. Many problems, including roof leaking and damage to equipment instruments and pipework due to the aging degradation of facilities are occurring.

According to the questionnaire survey, the number of cases where school activities were affected or where there were risks of damage to assets such as facilities, equipment and fixtures, for instance by roof leaking caused by degradation of facilities and other problems, totaled about 30,000 in FY2011 (Figure 16). This means that one functional problem is occurring at every public elementary and lower secondary school every year on average.

In addition, while the contents and methods of education are diversifying as time passes, there are facilities that cannot adapt to the current contents and methods of education, such as small-group education and ICT education.

Further, countermeasures for facilities such as deteriorated toilets are needed, not only in terms of sanitation but also for students with disabilities. Because it is assumed that school facilities are used by elderly citizens as a regional base, the promotion of barrier-free access to the facilities, such as elevators and slopes, will also become necessary.

Damage to pipework due to degradation

Frequent leaking caused by the degradation of the waterproof finish due to deterioration

A bad smell due to the deteriorating toilet

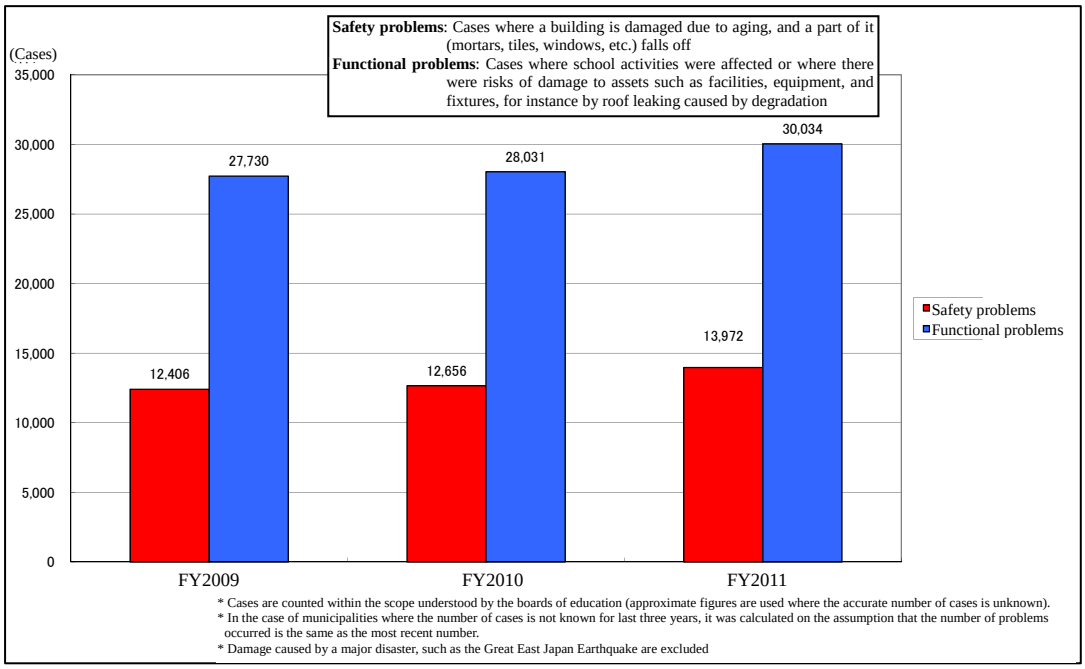

Figure 16: Problems that occurred mainly due to deterioration (questionnaire survey)

(3) Environmental issue

Many existing facilities do not have heat-insulated walls or windows, and it is difficult to ensure a favorable thermal environment. It also causes waste in terms of energy conservation. In terms of lighting, which accounts for a large portion of energy consumed in school, energy saving is not attempted sufficiently. According to the Act on the Rational Use of Energy (Act No. 49 of 1979) amended in May 2008, preparation and submission of a mid- and long-term plan are required for boards of education with annual energy consumption exceeding a certain level.[10] In addition, because the electricity supply decreased significantly in the aftermath of the Great East Japan Earthquake, school facilities are also required to reduce energy consumption more than ever so as to hold down electricity demand.

It is assumed that global warming countermeasures and electricity supply-demand measures must continue to be taken. Among public school facilities, which take up about 40% of total public facilities, it is necessary to ensure a favorable thermal environment and to reduce the quantity of energy consumed and CO_2 emissions, by actively advancing energy-saving through environment-focused refurbishments and the utilization of renewable energy.

(4) Financial issue

Leaving aged facilities without solving the problems will result in a greater burden in the future, forming what is referred to as “hidden debts.” As a result of the estimation by this Committee for Research Studies on refurbishment/reconstruction expenses for public elementary and lower secondary school facilities for 30 years from now on under a certain condition, it was found out that a huge amount of renewal expenses is forecast, peaking at around 2028, which is the time for the renewal of facilities developed from the 1970s to the early

[10] This “certain level” refers to the case where the annual quantity of energy consumed (crude oil equivalent) by all schools and other education institutions managed by the board of education is more than 1,500kl in total. Although the energy use per school differs greatly according to the climate of the region or the size of the school, it is considered that the criteria applies to boards of education covering about 20 schools in a cold region or about 40 schools in a warm region. Because a board of education not only covers schools but also libraries and citizens’ public halls, there may be boards of education to which the criteria are applied with a smaller number of schools.

1980s.[11] Because there is a risk that countermeasures against deterioration will not be able to be taken for a significantly greater number of facilities in the future, under national and local governments' severe financial situation, it is necessary to fundamentally reconsider conventional ideas and take adequate measures from the perspective of construction expenses.

[11] Refer to p.103 for the condition and results of estimation.

Chapter 2: Basic Idea of Countermeasures against Deterioration

1. Ideal state

Upon advancing countermeasures against the deterioration of school facilities, it is necessary to not only restore the original state of degraded facilities, but also to convert them into facilities that can adapt to the needs of the era. Upon doing so, it is important to renew the facility with the aim of ensuring a safe and secure facility environment, improving the quality of the educational environment, and forming a base of the regional community.[12]

(1) Ensuring a safe and secure facility environment

Because school facilities are a space for children's learning and living, and at the same time the center of the local community as well as facilities that serve the role of a disaster-prevention base, it is necessary to ensure a safe and secure environment for them. Therefore, it is important to take measures to ensure the earthquake resistance of school facilities and the earthquake resistance of non-structural elements such as ceilings, measures to prevent elements from falling due to aging degradation, measures to prevent accidents, and safety measures for gas, water, electricity equipment and pipework, etc., to ensure disaster prevention and safety, and at the same time to establish a facility environment that gives a feeling of assurance, ensuring crime-prevention such as preventing suspicious individuals from intruding.

(2) Improvement of the quality of the educational environment

According to recent changes in the contents and methods of education, it is necessary to ensure a facility environment that keeps up with the times. Consequently, it is important to ensure a learning environment allowing various contents and forms of learning and the introduction of various kinds of educational devices, and at the same time make a flexible plan for action in the long-term with respect to the progress of school education and informatization in the future.

In addition, as a space for learning and living for children, who will lead Japan in the future, it is necessary to ensure a healthy and enriched facility environment. Therefore, it is also important to ensure a favorable thermal environment by taking into consideration sun radiation, lighting, and ventilation, to create a facility not only for energy saving and the reduction of CO_2 emissions, but also for considering an environment that is conducive to environmental education. At the same time, it is also important to ensure an educational environment with warmth and affluence, by utilizing wood, which is the traditional construction material in Japan, as well as an environment giving consideration to students with disabilities.

(3) Formulation of regional community bases

As one of the most familiar public facilities for local residents, it is necessary that the utilization of school facilities as the core of community building and a space for lifelong learning is further promoted even more actively. Therefore, it is necessary to promote barrier-free access to facilities while giving consideration also from the perspective of universal design,[13] assuming various kinds of users, including parents and local residents. In addition, it is important to collaborate with other educational facilities and elderly welfare facilities, serve the role as the regional disaster-prevention base, and to function as a facility contributing to the formulation of the landscape and streetscape where necessary.

Further, because school facilities account for about 40% of total public facilities, it is expected that efforts of

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[12] Upon considering these issues, it is also possible to refer to the process as shown in the *Concerning the Basic Concept of School Facilities Development* (March 2013).

[13] While the barrier-free concept is an idea to cope with barriers resulting from disabilities, universal design is an idea to design cities and living environments in advance so as to ensure the ease of use by various kinds of people regardless of disability, age, gender or race. (Basic Plan for Persons with Disabilities, Cabinet Decision in December 2002)

taking countermeasures against the deterioration of school will be diffused to other public facilities, such as citizens' public halls and social welfare facilities.

2. Direction of measures

(1) Development according to plan

With the number of aged facilities expected to increase further in the future, it is required to advance the development of facilities according to plan, while also forecasting future fiscal conditions. However, according to the results of the questionnaire survey, the percentage of local government implementing preventive maintenance management according to plan remained at around 10%. The ratio of local governments implementing degradation diagnosis and the formulation of mid- and long-term plans is less than 30% (Figure 17). The cost for technology applied increases as deterioration progresses, and the amount of refurbishment expenses also increases with the expansion of the range of maintenance and repair.[14]

Based on these facts, it is required to aim for a shift from the conventional corrective maintenance management—implementing maintenance when there are problems in facilities and equipment—to preventive maintenance management, which prevents problems in advance by implementing checkups and repairs of facilities and equipment according to plan.

Consequently, it is necessary to adequately understand the level of the degradation of school facilities and the progress of adapting to the contents and methods of education. At the same time, it is also required to make an evaluation based on gathered data, formulate a mid- to long-term development plan setting forth the timing and scale of refurbishment and reconstruction, and to implement development according to the plan. In doing so, it is effective not only to manage each facility individually, but also to implement integrated management of facilities within the region from the perspective of increasing efficiency. In addition, it is important that the development plan is a feasible one, through the understanding of the number of necessary facilities considering the elimination and consolidation of school facilities and the creation of complexes or the promotion of joint use with other public facilities, reflecting the estimation of the future number of students, and the shift from reconstruction to major refurbishment (as explained hereafter).

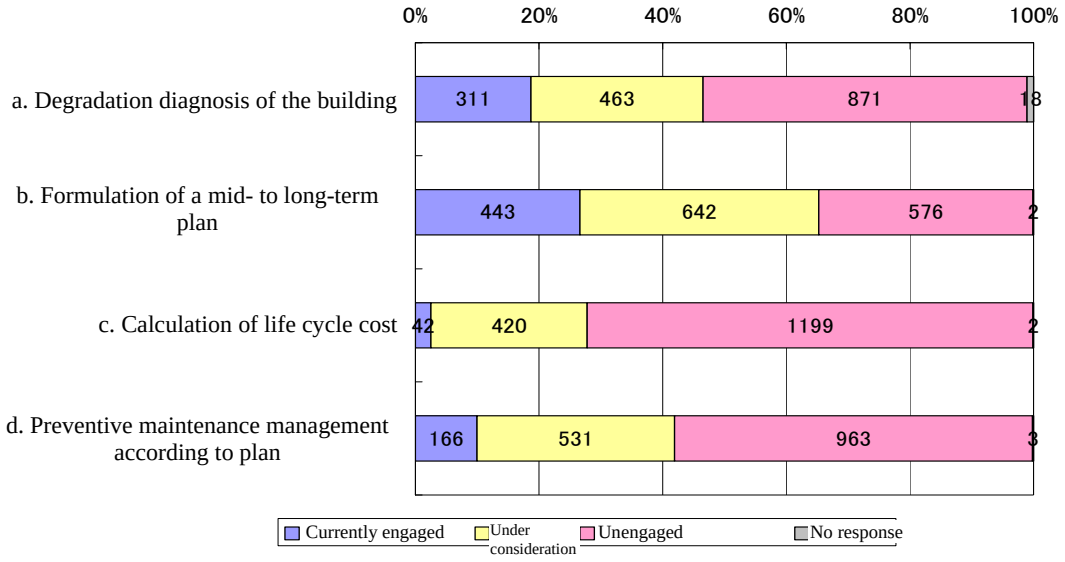

Figure 17: Active engagement in taking measures (questionnaire survey)

[14] For instance, it is estimated that, in the case of serious degradation, the maintenance and repair expenses of exterior tiles may be more than five times as much as in the case of only minor degradation. Refer to the Summary by the Study Group for the Revitalization of the Existing Stocks of Apartment Houses in Sustainable Society (Study Group for the Revitalization of the Existing Stocks of Apartment Houses in Sustainable Society, August 2012).

(2) Lifespan extension of school facilities

i. Situation surrounding reconstruction

The average time until the reconstruction of school facilities is approximately 42 years in the case of buildings made of reinforced concrete (Figure 8).

According to the results of the questionnaire survey, more than 70% of local governments that set the goal or rough indication of the reconstruction cycle set the cycle at 54 years or less, while those setting the cycle above 65 years account for less than 10% (Figure 18). Regarding the decision on the priority of reconstruction work, local governments that decide based on the degradation level of facilities found from an on-site survey account for the largest number. About 70% of local governments are making decisions based on the year of construction.

Further, as a reason for selecting reconstruction instead of refurbishment, the insufficient strength or neutralization of concrete was most frequently given. There are also many local governments giving the reason that refurbishment cost, which is generally expected to be considerably lower than reconstruction cost, is higher than expected, or that the statutory durable lifetime of the building expired (Figure 19).

Statutory durable lifetime for a school building made of reinforced concrete is 47 or 60 years.[15] However, this is merely for calculating depreciation for taxation. The actual physical durable lifetime of school facilities is longer than this, and if the facility is under adequate management and the strength of concrete and reinforcing steel bars are ensured, the facility may be durable for 70 to 80 years. Technically, it is even possible to extend the lifespan to more than 100 years.[16] Thus, care must be taken when deciding on reconstruction by focusing on the expiration of statutory durable lifetime.

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[15] Statutory durable years are set by the structure and use of the building according to the Ministerial Ordinance on the Durable Lifetime of Depreciable Assets (Ordinance of the Ministry of Finance No. 15 of 1965). The durable lifetime of schools made of reinforced concrete was originally set at 60 years, but was shortened to 47 years by the FY2008 amendment.

[16] In the case of schools made of reinforced concrete, the ideal durable lifetime of the entire building is from 50 to 80 years in the case of normal quality, and from 80 to 120 years in the case of high quality (*Practical Guide for Service Life Planning of Buildings*, Architectural Institute of Japan). There are also cases where local governments individually set the durable lifetime, as in the case of Nagoya City (80 years) and Tachikawa City (70 years).

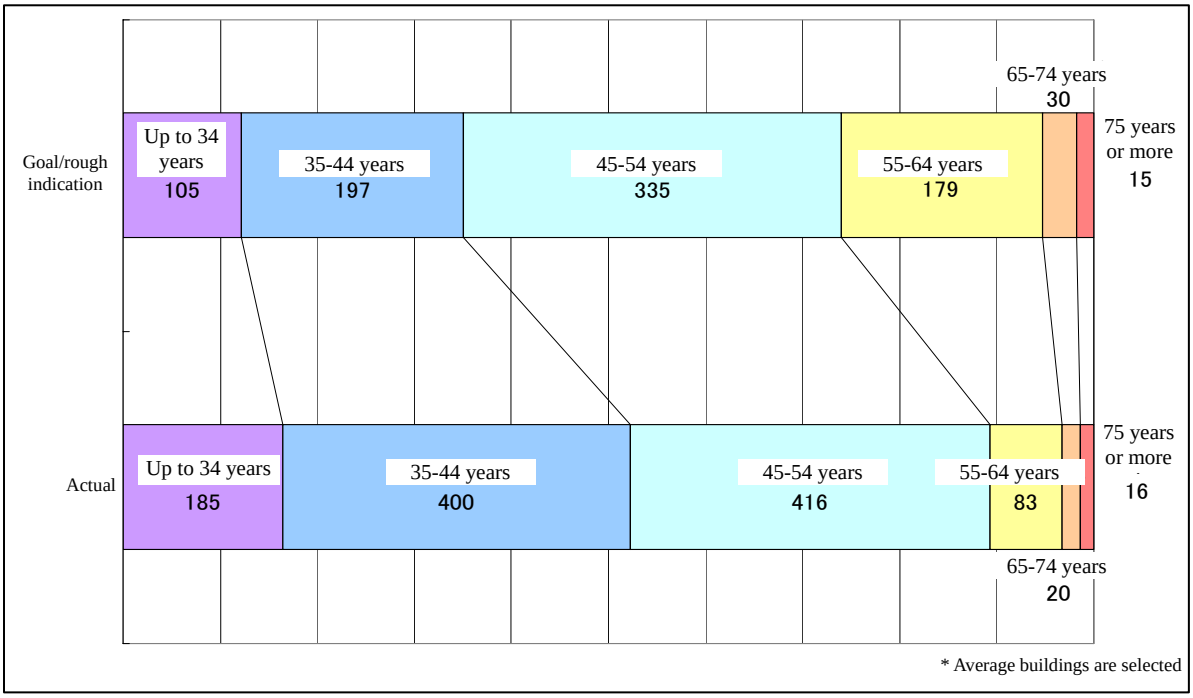

Figure 18:Reconstruction cycle related to the deterioration of school buildings and gymnasiums (questionnaire survey)

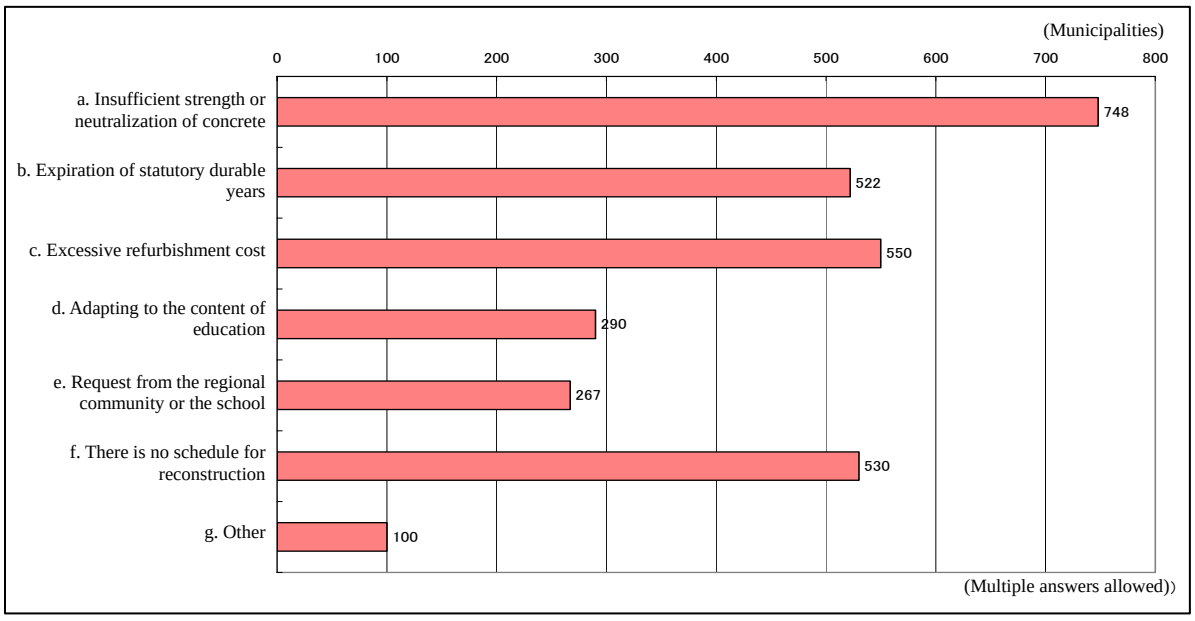

Figure 19: Reasons for selecting reconstruction instead of refurbishment (questionnaire survey)

ii. Estimation of renewal expenses

According to the estimation by the Consultative Committee for Research and Surveys, it is expected that a huge amount of renewal expenses is forecast, peaking at around 2028, which is when facilities developed from 1970s to early 1980s will be renewed. Thereafter, the expected amount of renewal expenses will decline considerably according to the reduction of the number of facilities requiring renewal.

On the other hand, according to the same estimation, it became clear that a shift from the conventional type of development that mainly implements reconstruction to major refurbishment for the lifespan duration of school facilities (hereinafter referred to as the "major refurbishment"[17]) will level the expected renewal expenses, and will also work to hold them down.[18]

As for renewal expenses shown in this estimation, one must note that they may be reduced as progress is made in construction technology and due to other reasons, and that there is also room for large fluctuation depending on the degree of the reduction of retained area according to the further decrease in the number of children or the utilization of major refurbishment.

iii. Introduction of major refurbishment

Based on such facts, it is necessary that the vast number of school facilities should consider making a transition from the conventional reconstruction to the major refurbishment, which requires less construction cost compared to reconstruction and emits less waste and CO_2, in order to ensure safety and improve the function of facilities as much as possible with a limited budget, under national and local governments' severe fiscal conditions.

In order to implement the major refurbishment, it is considered necessary to evaluate the durability of facilities and to confirm that the facility can be used for a certain period of time in the future. For example, a certain local government sets forth as a general rule to implement the major refurbishment for facilities that are generally 40 years old or older, and are expected to be usable for more than 40 years from now according to the results of the evaluation on the durability of structure, based on the corrosion of reinforcing bars and the neutralization of concrete.

Upon implementing the major refurbishment, it is important to try to improve the quality of the educational environment by making a functional plan that adapts to the recent varied content and form of learning. At the same time, it is also important to take in the perspective of retrofitting,[19] which is an development in line with the modern societal demands such as energy saving, including the improvement of the heat isolation function of walls and windows and the introduction of highly-efficient lighting and air conditioning, utilization of renewable energy, reinforcement of disaster-prevention functions, utilization of wood, and the promotion of barrier-free access, rather than simply restoring the state the facility was in a few decades ago at the time of construction.[20]

Upon shifting from reconstruction to major refurbishment, it should also be noted that there are facilities where the durability of structure cannot be ensured, such as facilities with insufficient concrete strength, facilities that cannot easily adapt to recent contents and methods of education through refurbishment due to the

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[17] This includes for example an improvement of higher grade compared to the ordinary refurbishment with the aim of using a facility, which is subject to reconstruction after 40 years of construction under the current system, for about 70 to 80 years. It includes countermeasures against the neutralization of concrete, countermeasures against the corrosion of reinforcing bars, use of paint and waterproof material that do not become degraded easily, renewal of gas, water, electricity and other lifelines, heat insulation, double sash, energy-saving measures such as shielding sun radiation, and adapting to the content and method of education, such as small-group guidance. However, the specific measures should be further considered.

[18] Refer to p. 103 for conditions and estimation results.

[19] "Retrofitting" refers to remodeling and revamping an old model into a new model.

[20] In particular, when considering the lifespan extension of facilities, it should also be noted that many facilities constructed by around 1985 and after have improved construction elements incorporated through new efforts such as participation by local residents.

layout planning of classrooms and others, or facilities that are forced to reconstruct because of regional factors, such as the adequate distribution of schools.

(3) Prioritization and concentration

Under the national and local governments' severe fiscal conditions, demand for the development of school facilities where upgrading is necessary is expected to increase in the future. In such situation, it is important to rank facilities in terms of need for development by making comprehensive and objective evaluations of school facilities to be developed so as to win the understanding of relevant parties and local residents concerning the policy of development, and to implement development starting with the facilities that really need it.

With the number of students decreasing, the area of school facilities has remained unchanged recently. With the number of students expected to further decline in the future, it is necessary to review the adequate size of school facilities, while also envisaging the trend of the number of students and the circumstances of regions, as well as the effective utilization of existing stock. In doing so, it is also possible to further promote the effective use of vacant spaces, such as spare classrooms, while paying attention to adapting to changing methods and contents of education, and to consider the creation of complexes or the promotion of joint use with other public facilities according to the situation of the region while also viewing the use of school facility as the core of the region (Figure 20). If such conversion of facilities cannot be expected, the possibility of downsizing school building premises, which means to strip down unnecessary parts of the retained facilities, should be considered, because solely retaining a facility carries a cost in terms of maintenance and repair.[21]

Particularly regarding the creation of complexes or the promotion of joint use with other public facilities, educational effects can also be expected, enabling students to use the public facility more easily and generating an occasion for exchange with the people of the region. Further, it is also possible to generate financial sources by renting or selling the land that became vacant due to the creation of a complex or joint facilities.

Figure 20: Creation of complexes with other public facilities (example)

[21] The national average annual repair expense in elementary and lower secondary schools is about 600 yen/m^2. If there is a spare space of 10% for example, the repair expenses of said part will be 4.5 million yen/year per establisher based on the current level.

Chapter 3: Specific Measures on Renewal and Development in the Local Government

1. Development of facilities through the PDCA cycle[22]

(1) Correct understanding of the current situation

In order to efficiently and effectively renew the huge quantities of aged facilities that will increase even more in the future under severe fiscal conditions, it is necessary to adequately understand not only the history of refurbishment and years of depreciation, but also the current situation of facilities, such as the extent of degradation and the level of adapting to the contents and methods of education.[23] In doing so, it is important to comprehensively and objectively understand the current level of the facility in question. It is also necessary for these efforts to be implemented regularly on an ongoing basis. In addition, it is important for the data acquired to be stored and utilized by forming a systematic database.

It is also effective to gain a comprehensive understanding of the current situation, including the degradation and use of other public facilities in the region, considering the possibility of the effective use of existing stock and the creation of complexes, and the promotion of joint use under the further decline in the number of children in the future.

(2) Consideration and formulation of development plan

Upon implementing the refurbishment/reconstruction of school facilities, it is important to streamline the current issues understood in the process as explained above, and to formulate a mid- to long-term plan by making adjustments with the general mid- to long-term administrative plan, education vision and the Basic Plan for the Development of School Facilities, etc. of the local government in question,[24] while also considering the trend of the number of students. In the course, one should try to clarify the timing for the development of individual facilities, and to implement facility management aiming for the lifespan extension, the effective use of space, and maintaining the adequate size of the facility, while also considering the situation of the existing stock and the expected use of the facility in the future. It is also important to include the policy of leveling the business cost according to the priority of development, also based on the fiscal revenue and expenditure and decline in the number of children.

There are cases where the maintenance expenses, repair expenses, improvement expenses and operation expenses (light, fuel and water expenses), occurring at the stage of operation and maintenance, among the expenses necessary for the management of the facility, become four to five times larger than the original construction cost. Therefore, the facilities to be developed should be focused, based on the priority streamlined according to the understanding of the current situation. It is also important to formulate an implementation plan taking into consideration the targeted durable lifetime and the calculation of life-cycle cost.

It is also important to consider and formulate the plan based on the understanding and consent of the wide range of relevant parties, through participation by teachers and other staff members, parents, local residents, and relevant administrative departments, as well as to widely notify the local residents and others of the details and meaning of the plan.

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[22] PDCA is the cycle of plan, do, check and action. “In order to adequately maintain and improve school facilities, it is necessary to first understand the actual state of the facilities, such as what kind of condition the school facility is currently in, and how it is operated. Then, by adequately self-evaluating the efforts, it is necessary to lead them to efficient maintenance/improvement according to plan.” (*Concerning School Facility Evaluation: Improvement of School Facilities*[Final Edition], March 2009)

[23] It is also effective to utilize the perspective shown in *Concerning School Facility Evaluation: Improvement of School Facilities* [Final Edition] (March 2009) when ascertaining the situation of adapting to the contents and methods of education.

[24] Refer to the *Concerning the Basic Concept of School Facilities Development* (March 2011) for the basic idea and process of formulating the basic plan for the development of school facilities.

(3) Implementation of refurbishment, etc.

Upon implementing refurbishment, etc., it is important to make the plan considering the ease of daily maintenance. For instance, it is effective to make a flexible plan to facilitate the changes of partition and pipework arrangements in preparation for changes in demand in the future.

Further, effort should also be made to reduce life cycle cost, such as reducing light, fuel and water expenses through measures such as heat insulation and the utilization of highly-efficient lighting, air conditioning, and renewable energy such as solar energy.

It is important to maintain the same idea also in the case of implementing reconstruction, and to make a highly flexible plan that is capable of adapting to changes in the future, in the expectation of a longer period of use for the facility.[25]

(4) Implementation of adequate maintenance

Detecting problems with facilities and equipment, and taking action at an early stage not only prevents accidents, but also results in economic maintenance as a whole. Therefore, it is important to implement repair according to the plan from a mid- to long-term perspective, in addition to the adequate implementation of daily checkups and cleaning by teachers and other staff members, or establisher. Further, it is also important to formulate a mid- to long-term repair plan setting forth the timing and parts of maintenance and repair, and at the same time try to secure human resources and budget so that repair work can be implemented securely according to the plan.

In addition, daily maintenance is the key to the lifespan extension of the facility. Consideration of cost, such as the utilization of a part of the expenses that would have been used for reconstruction in the past for maintenance and repair, or measures such as implementing a medium-scale repair where necessary may also be effective.

(5) Implementation of ongoing evaluation

It is important to continue to verify the effects of development and at the same time streamline the issues to be improved, such as more effective development methods, and establish a cycle to incorporate them into the next plan.

2. Reinforcement of the organizational system

For implementing development as listed above, a certain level of technical knowledge, such as the diagnosis of the degradation level or the formulation of plans, is necessary. However, according to the results of the questionnaire survey, about half of all local governments do not have technical staff in charge of facilities at the board of education (Figure 21). Among these local governments, the formulation of a mid- to long-term development plan is lagging compared to local governments with technical staff in charge of facilities (Figure 22).

In order to accurately understand the situation of deteriorated facilities, the number of which is expected to further increase, and to implement refurbishments by formulating a timely and adequate plan in the future, it is required to reinforce the organizational system while also gaining cooperation from departments in charge of

[25] When implementing construction work, it is necessary to pay attention to the following facts: (i) process and construction cost in the case of refurbishment depend largely on the conditions of individual construction; (ii) short-term construction is desirable because of noise, vibration and dust; (iii) the total plan may extend to more than one year; (iv) consideration at the stage of ordering the construction work, for ensuring a sufficient preparation process and the shortest on-site process, is particularly important in order to finish the work during the summer vacation; (v) construction of temporary school buildings may result in higher cost. Effective methods should be under further consideration.

repairs. It can also be expected to collaborate with neighboring local governments for the maintenance and management work of facilities under jurisdiction, such as by utilizing the mechanism of administrative association.[26]

In addition, it is also important to provide a mechanism to supplement the lack of technical knowledge in various ways, such as re-employing the retired technical staff in part-time engagement, as well as to pay attention to the succession of such knowledge by younger generations.

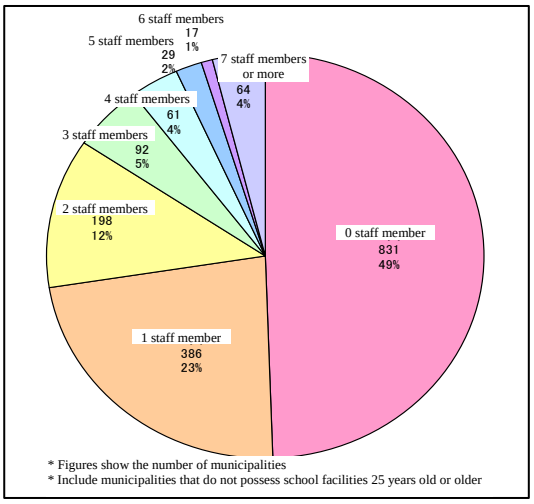


Figure 21: Number of technical staff members in charge of facilities at boards of education (questionnaire survey)

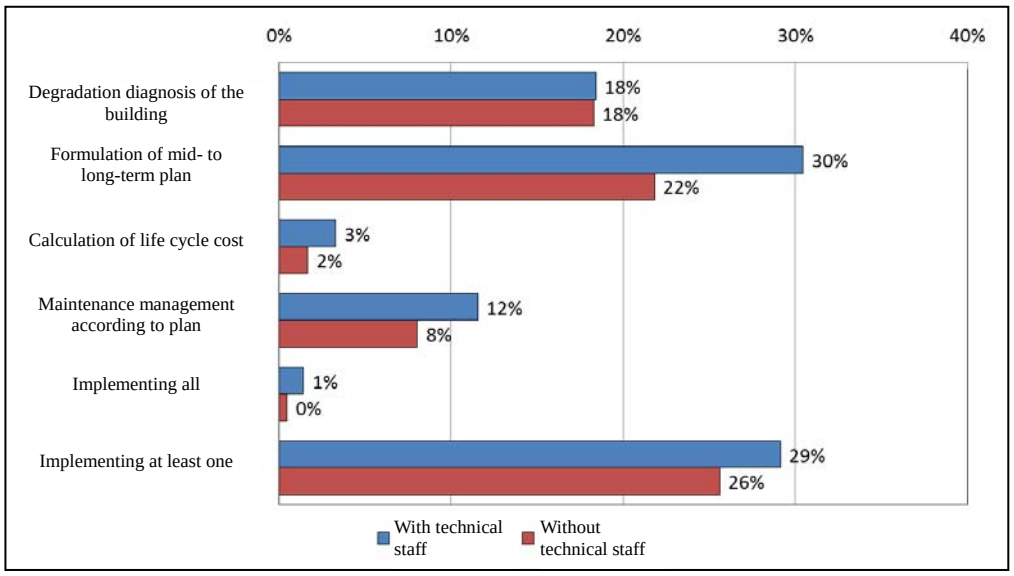


Figure 22: Active engagement in taking countermeasures against deterioration (questionnaire survey)

[26] Paragraph 2, Article 234 of the Local Autonomy Act (Act No. 67 of 1947) states that "ordinary local public governments and special wards may establish an administrative association, by providing rules and obtaining the permission of the Minister of Internal Affairs and Communications for those in which prefectures will participate, and of the governor of the prefecture for others, in order to jointly treat a part of their clerical work." As for an administrative association related to educational clerical work, it is required to hear opinions from the Minister of Education, Culture, Sports, Science and Technology, or the committee of the prefecture in question, before obtaining the permission of the Minister of Internal Affairs and Communications or the governor of the prefecture (Paragraph 5, Article 60 of the Act on the Organization and Operation of Local Educational Administration [Act No. 162 of 1956]). In addition, Article 55-2 of said Act provides, "municipalities shall cooperate with neighboring municipalities to promote regional education, by promoting collaboration including the joint establishment of the board of education according to Paragraph 1, Article 252-7 of the Local Autonomy Act, and endeavor to develop and reinforce the system of educational administration in the region.

Chapter 4: Promotional Measures by the National Government

1. Promotion of development according to plan

The national government must support local governments in formulating a development plan, through measures such as showing a reference model or points to keep in mind, so that the local governments can promptly and effectively formulate a mid- to long-term development plan on aged school facilities. It is also required that the national government support the efforts by the local governments, such as showing points to keep in mind or points to be improved so that teachers and other personnel or the staff of local governments can implement daily maintenance and repair in an adequate and easy manner.

Further, based on the fact that there is not enough technical staff in charge of facilities at boards of education, it is also necessary to establish a system to provide technical support according to the regional conditions.

2. Promotion of lifespan extension

The national government should provide support to local governments so that lifespan extension can be promoted smoothly even by local governments with less technical knowledge, such as providing specific examples of major refurbishment and shorten the construction period, rough measures on the timing of refurbishment/reconstruction, and guidelines on the systematically-compiled cost examples. It should also offer support to pacesetting examples, and to developing a tool to calculate life cycle cost easily.

It is also necessary to improve supplemental measures for the local governments to extend the lifespan of facilities while also coping with modern societal demands, including the improvement of the quality of the educational environment, energy saving, and the promotion of barrier-free access, including measures such as the review of projects funded by national subsidies and subsidies cap, and the relief of the fiscal burden of local governments, so as to promote the shift from reconstruction to major refurbishment.

3. Promotion of prioritization and concentration

While demand for the development of school facilities where upgrading is necessary is expected to increase, the national government needs to develop an index for the comprehensive and objective evaluation of the extent of degradation, environmental performance, adapting to the contents of education, etc. of facilities, so that local governments can start with the development of facilities that urgently require it.

In addition, with the number of students expected to further decrease in the future, it is necessary to review existing stock to ensure adequate size. It is also necessary to review required areas based on the ideas of facilities adapting to changes in the learning environment such as the amendment of the Courses of Study and the promotion of special needs education, or facilities coping with a smaller number of children.

Chapter 5: Issues to be Addressed in the Future

Considerations made so far mainly included the basic idea for promoting countermeasures against deterioration, specific ways to advance renewal and development of facilities by local governments, and national measures for promotion. From now on, it will also be necessary to consider the possibility of introducing and utilizing private funds according to the situation of the region, when creating complexes or promoting joint use with other facilities, while also gathering information on cases where such introduction and utilization have already been implemented. In addition, although the Consultative Committee for Research and Surveys had been making considerations mainly for public elementary and lower secondary schools, it is also necessary to streamline the points that require special attention and care regarding kindergartens, upper secondary schools, schools for special needs education, etc. and discuss the points repeatedly.

It is also expected that the role of schools may change in the future according to further decreases in the number of children. Under such situation, it is desirable to take into consideration the educational methods, teacher deployment, development of facilities, and the position of the school in the region, while also viewing the review of the size of individual facilities, and gathering and analyzing necessary information.

Part 2: Advanced Case Examples

(Table of Contents)

1. Understanding the Current Situation of School Facilities

Points of the Indications in the Vision for Countermeasures against the Deterioration of School Facilities

○ In order to efficiently and effectively renew the huge quantity of deteriorated facilities that will even increase in the future under the severe fiscal condition, it is necessary to adequately understand the current situation of facilities, such as the degree of the degradation and the level of adapting to the content/method of education.

○ It is important that the data ascertained are stored and utilized by forming a systematic database.

Case Examples Shown

Introduced here are case examples where the durability, adaptability to learning activities and environment adaptability of the facilities are evaluated, and are utilized such as for prioritizing the development of facilities and calculating life cycle cost.

There are also case examples where the basic information and construction history of public facilities are compiled into a database, to be utilized in systematic and cross-sectional management.

◆ **Understanding the situation, diagnosing the degree of degradation, and recording them**

1-1 Nagoya City (Aichi Prefecture)	Survey on structural durability
1-2 Kawasaki City (Kanagawa Prefecture)	Evaluation based on objective indices on adaptability to learning activities, etc.
1-3 Musashino City (Tokyo)	Compiling the degree of degradation and the progress made in repairing public facilities, including school facilities, into a database

1-1
Survey on structural durability

Aichi Prefecture

Nagoya City

1. Background

In order to deal with the deterioration of buildings established by Nagoya City, the city formulated the Nagoya City Basic Principles on Asset Management and the Nagoya City Asset Management Promotion Plan, which provide for efforts in holding down and leveling expenses for facility development through the lifespan extension of schools and other facilities, and the adequate use of the city's assets.

Upon carrying forward the lifespan extension of facilities, the city is implementing a survey on the structural durability of facilities that are about 40 years old, including schools, in order to understand how much longer the buildings can be used.

2: Details of the effort

Preliminary survey

Design documents and the results of regular inspections are confirmed, and the location in the buildings to be surveyed were considered.

Visual inspection of appearance

Cracks, exposed reinforcing bars, and other problems in buildings to be surveyed based on the results of the preliminary survey were confirmed, and the locations to be surveyed were considered.

Physical investigation

Durability was evaluated based on the degree of the corrosion of reinforcing bars inside the structure as well as the degree of neutralization and the amount of chloride in the concrete, and the compressive strength of the concrete was confirmed, through measures such as collecting concrete samples from the survey location. [Figure 1] to [Figure 3]

3: Period and expenses (with about 120 buildings surveyed)

Period: About two months for the preliminary survey by technical staff
About three months for the visual inspection of appearance and physical investigation by outsourcing

Expenses: About 200,000 yen per building

4: Points of special attention

- In many cases, different parts of the school building were constructed at different times due to repeated extension work, so survey locations were set by dividing up each school building according to construction years and floors.
- Careful consideration was made in determining where to take samples, such as pillars and frame walls in the case of investigating reinforcing bars, and parts without coating materials in the case of investigating the degree of neutralization.
- The survey was implemented by giving consideration to school operation, such as taking samples during long vacations.

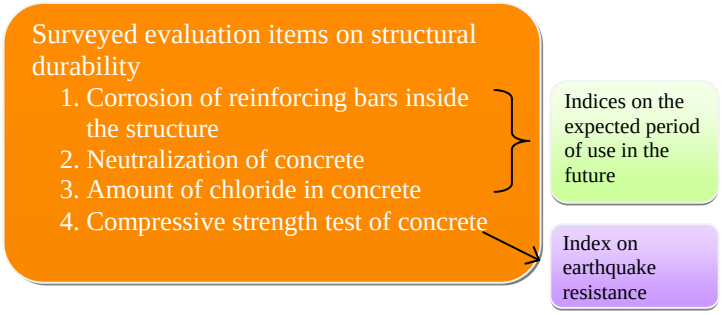


Figure 1: Surveyed evaluation items on structural

<Reference chart> Method of survey on structural durability

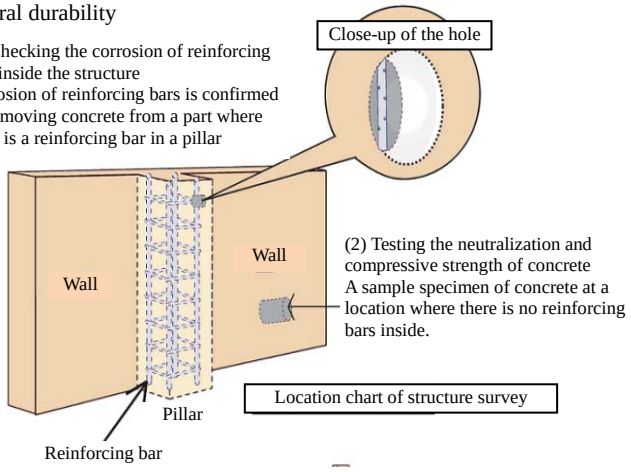


Figure 2: Method of survey on structural durability

☆ Photo of concrete specimen (implementation of neutralization test)

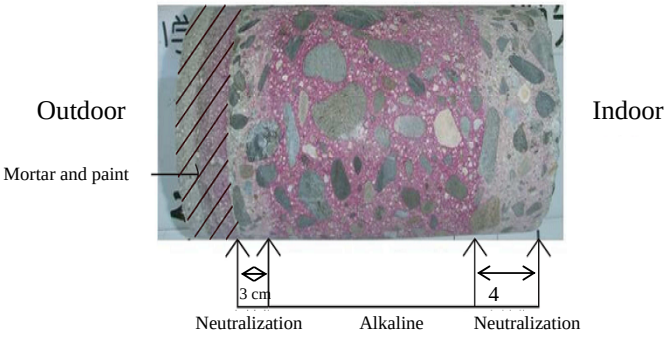


Figure 3: Photo of concrete specimen

5: Achievements and problems

- The results of the survey so far made it clear that some facilities have a lifetime longer than 60 to 65 years, which is the generally recognized durable lifetime.
  (* Refer to 3-2. Setting the targeted lifetime [80 years].)
- Further confirmation from different perspectives, such as satisfaction regarding function and costs, is necessary in order to consider the development method and priority in the future.

1-2

Evaluation based on objective indices on adaptability to learning activities, etc.

Kanagawa Prefecture

Kawasaki City

1: Background

While about 70% of schools were constructed 20 years or more ago, the effective management of school facilities must be realized in order to cope with the issue of deterioration and diversified needs for the facility environment. Consequently, it is necessary to accurately understand the condition of facilities, and make an evaluation while managing information on facilities.

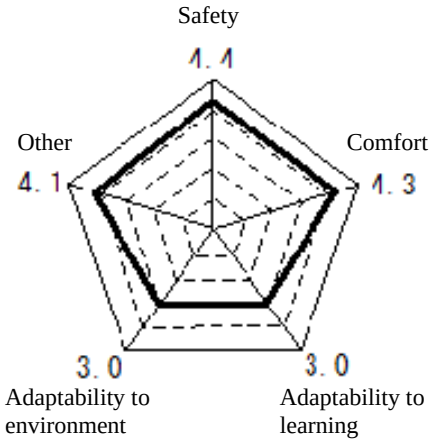
2: Details of the effort

Implementation of evaluation

Using *Concerning School Facility Evaluation: Improvement of School Facilities* (Final Edition) (March 2009, by the Committee for Research Studies on the Visions of School Facilities) as a reference, evaluation was implemented from five perspectives: safety, comfort, adaptability to learning activities, adaptability to environment, and other.

As for "safety," "comfort" and "other," on-site surveys were implemented to understand and evaluate conditions, while a questionnaire and interviews were implemented on schools to understand and evaluate operations for "adaptability to learning activities." As for the evaluation of "adaptability to environment," CASBEE (Comprehensive Assessment System for Built Environment Efficiency) for schools was used.

Evaluation was made for each building in the facilities ledger. Then, the facility evaluation of each building was allocated by floor area, to derive the total evaluation of the school, and quantify and visualize the condition of school facilities.



Visualization of evaluation results

Preparation of school record cards

Data on the quantitative evaluation of all city-operated schools (172 schools), including basic information such as the structure/size, area and year of construction of the facility as well as the repair history and facility evaluation, were uniformed and streamlined.

Evaluation item			Evaluation item (details)
Safety	Degradation of the building (deterioration)		Degradation of rooftop and roof
			Degradation of rooftop metal hardware
			Degradation of outer wall
			Degradation of the underneath surface of eaves (balconies)
			Degradation of sashes
			Degradation of miscellaneous exterior fixtures (metal hardware, etc.)
			Degradation of inside floor
	Measures against falling objects	Condition of non-structural elements	Degradation of inside walls
			Degradation of inside fittings
			Degradation of inside ceiling
			Use of fragile glass (opaque glass)
			Cracks in window glass, etc.
			Corrosion and looseness of the mounting hardware of lighting apparatus
			Use of suspended-type lighting
	Measures to prevent falls		Existence (fixing) of footholds at windows
	Disaster prevention measures		Preparation of toilets in gymnasium
			Preparation of toilets accessible from outside
			Preparation of storage warehouse for disaster prevention
			Preparation of facilities to secure water at the time of disaster
			Preparation of in-house power generation facilities
	Anticrime measures		Locking up gates
			Installation of security camera
			Installation of outdoor lights
			Installation of signboards prohibiting the entrance of suspicious individuals
	Degradation of outdoor facilities (deterioration)		Degradation of fences and gates
Comfort	Barrier-free access		Elimination of differences in level on the floor (entrance, corridor, toilets)
			Installation of handrails (corridor, toilets)
			Installation of wheelchair-accessible toilets
			Existence of elevators
	Maintenance of water supply drainage facilities		Maintenance of water supply piping (occurrence of rusty water, etc.)
			Maintenance of drainage facility
	Preparation of toilet facilities		Sanitation (contamination, smell)
			Installation of western-style toilets
			Breakage of toilet bowls
	Checkup of sanitary facilities		Checkup of the sanitation of toilets and cleaning of toilets
	Maintenance of classroom blackboards		Deterioration of blackboards
			Maintenance of bulletin boards
Adaptability to learning activities	Adapting to the use of ICT		Internet access
	Development of learning environment		Securing of classrooms as specified in facility development criteria, etc.
			Securing of areas as specified in facility development criteria, etc.
			Securing of classrooms and others coping with varied instruction methods
			Use of classrooms and others coping with varied instruction methods
Adaptability to environment	Sound environment		Noise level in the room
	Thermal environment		Level of room temperature
			Humidity level
	Light and visual environment		Measures against reflection
			Lighting intensity
	Air quality environment		Amount of chemical pollutants (formaldehyde, etc.)
			Amount of mites and mite allergens
			Carbon dioxide concentration
	Corresponding to energy saving		Reduction of the thermal load of the building (installation of insulators, glass and sunshields)
			Use of natural energy as is (for ventilation and lighting)
			Use of converted natural energy (solar power generation, etc.)
			Energy-saving measures for air conditioners
			Energy-saving measures for lighting facilities
			Operational management system for reducing energy consumption and environmental load
			Introduction of water-saving system
			Use of rainwater
Other	Measures to prevent problems in the neighborhood		Curbing the problem of blocking sunshine in the neighborhood
			Dust prevention measures for the neighborhood
			Measures to prevent balls used for sports from entering the neighborhood
	Opening of schools to the regional community		Opening of the schoolyard
			Opening of the gymnasium
			Opening of classrooms

Evaluation items

3: Period and expenses

Period: From FY2011 to FY2013

Expenses: Approximately 26 million yen (for all 172 city-operated schools)
(Includes expenses for the formulation of a basic policy, understanding the situation and facility evaluation, preparation of record cards, calculation of LCC, and formulation of a long-term preservation plan for school facilities, but excludes expenses for system introduction.)

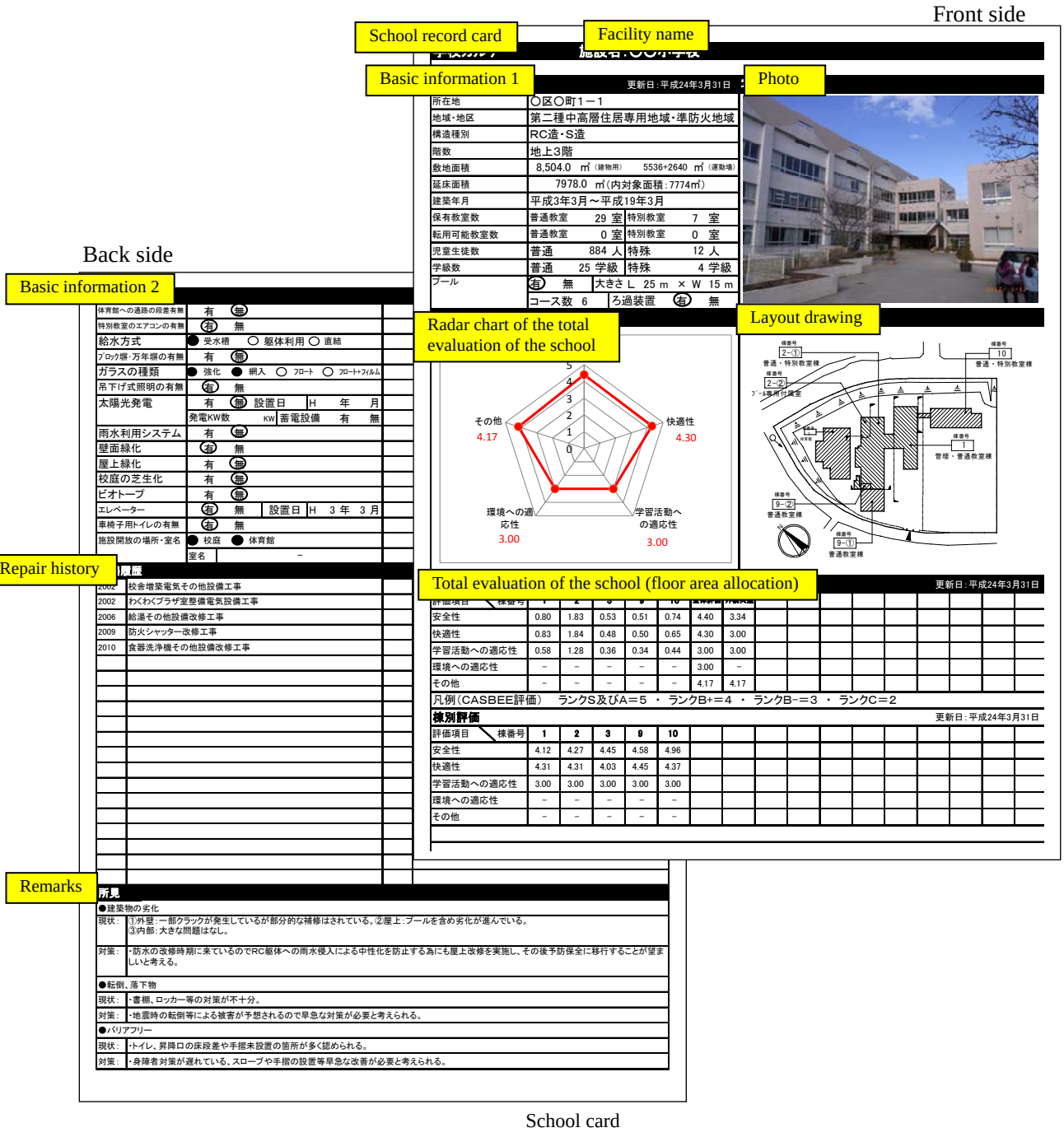
4: Points of special attention

It was intended to unify the evaluation and prevent deviation in understanding and evaluating the conditions of school facilities by having all investigators survey one model school at first. In addition, the results of the checkup specified in Article 12 of the Building Standards Act will be utilized for continuous implementation of evaluation in the future.

5: Achievements and problems

School record cards summarizing the results of the quantified evaluation of school facilities are utilized for: (i) facility development according to plan based on the priority of facility improvement, such as countermeasures against deterioration, the improvement of quality, and environmental measures, (ii) adapting to individual issues for ensuring a safe and comfortable educational environment, and (iii) setting plans for preventive maintenance for the life extension of facilities.

The issue for the future is to establish a method to efficiently and effectively continue questionnaires and interviews to 172 schools.



1-3

Compiling the degree of degradation and the progress made in repairing public facilities, including school facilities, into a database

Tokyo

Musashino City

1. Background

Before, facility ledgers and construction ledgers were not sufficiently prepared, even in departments mainly in charge of the management of facilities and the Construction Section, Construction Department (the current Facilities Management Section, Finance Department), to which the construction is consigned. Therefore, facility development had not been implemented according to plan, and there were cases of delayed responses to sudden accidents. After an incident where similar construction work was implemented twice at the same facility with an interval of only a few years, caused by a lack of recognition, the necessity of ledgers and planned facility development was realized. In FY2001, a facility data management system was introduced.

2: Details of the effort

Data collection

Two people in charge of the facility development plan were deployed to the Construction Section to collect data on the basic condition and construction history of facilities from copies of confirmation applications and construction contract documents for all facilities owned by the city.

System construction

The facility data management system was introduced so as to allow for the unified management of data and collected refurbishment drawings, and the information was shared within the section. After the introduction of the system, design documents and records of all construction work implemented after the collection of data and information that is considered necessary for improving the facilities are accumulated to further enrich the database.

Preparation of long-term repair plan

Expenses for the renewal of building elements, facilities and equipment due to malfunction (remaining malfunction expenses) were calculated by ascertaining the current situation through on-site surveys and setting the targeted durable lifetime for individual facilities. A long-term repair plan was prepared to allow the implementation of planned development of facilities, in order to extend the lives of facilities.

3: Period and expenses (with about 120 buildings surveyed)

FY2000: Gathering of basic information by the staff
FY2001: System construction (approx. 6.6 million yen)
From FY2001 to FY2003: Preparation of the long-term repair plan (approx. 5.64 million yen)

4: Points of special attention

Separately collected data were unified with the introduction of the facility data management system, and it became possible to accumulate the experiences and performances on maintenance in a systematic and cross-sectional manner. As a result, it became possible to take efficient actions at times of emergency, such as accidents, or when implementing the refurbishment of existing facilities, by utilizing these data.

In addition, it became possible to logically consider the budget scale of repair and refurbishment expenses. As a result, efficient implementation of facility development became possible with the planned budgeting of preventive maintenance measures.
(*Reference: 2-1 Adequate maintenance and management for life extension, such as the implementation of preventive maintenance)

In the future, it will be necessary to create a mechanism in collaboration with the departments mainly in charge of the management of facilities to accumulate information on light, fuel and water expenses as well as maintenance and management expenses, in addition to the data of the facility itself, and to allow not only the Facilities Management Section but also relevant departments to access the data.

Examples of Construction History

2. Lifespan Extension of School Facilities

Points of the Indications in the Vision for Countermeasures against the Deterioration of School Facilities

○ Amount of refurbishment expenses will increase with the progress of degradation. Therefore, a shift from the conventional corrective maintenance-type management to preventive maintenance-type management is necessary.

○ Upon implementing major refurbishment (for the lifespan extension of school facilities), it is important to implement an development in line with modern societal demands, such as adapting to the recent wide variety of learning contents and methods, energy saving, utilization of renewable energy, and the utilization of wood, while also considering the ease of daily maintenance and management.

Case Examples Shown

Introduced here are case examples of efforts in preventive maintenance and the renewal of structural building frames with major refurbishment.

There are also efforts to allow for long-term use of refurbished buildings, such as case examples on plans allowing for easy daily maintenance and management, and case examples to improve the quality of the educational environment while realizing energy saving and the use of wood materials for building interiors.

◆ **Adequate maintenance and management**

2-1 Musashino City (Tokyo)	Adequate maintenance and management for lifetime extension, such as the implementation of preventive maintenance

◆ **Efforts to allow for long-term use of facilities**

2-2 Yame City Fukushima Junior High School (Fukuoka Prefecture)	Renewal of the structural building frame through countermeasures against neutralization
2-3 Chigasaki City (Kanagawa Prefecture)	Shift to a plan ensuring the ease of maintenance and management
2-4 Kofu City (Yamanashi Prefecture)	Use of materials considering durability

◆ **Development in line with modern societal demands**

2-5 Kuromatsunai Town Kuromatsunai Junior High School (Hokkaido)	Improvement of the educational environment through environment-focused refurbishment
2-6 Tokigawa Town Tokigawa Junior High School (Saitama Prefecture)	Improvement of the educational environment through the use of wood materials produced within the region for building interiors

2-1

Adequate maintenance and management for lifespan extension, such as the implementation of preventive maintenance

Tokyo

Musashino City

1: Background

Before Musashino City introduced the planned system for facility development, personnel in the department mainly in charge of the management of facilities made budgetary requests based on the understanding of solely the condition of facilities under the jurisdiction of the department. Personnel in charge of budget assessment in departments for planning and finance were also separate for each budgetary expense item. Therefore, the results of assessment were not based on a cross-sectional understanding of all public facilities within the city, and the level of refurbishment varied by facility.

This resulted in a larger number of corrective maintenance cases, where construction work is implemented because of malfunctioning. The effort started with the staff questioning the situation and pointing out the necessity of planned maintenance.

2: Details of the effort

Preparation of record cards

Discussion held in FY2000 and FY2001 on the planned development of facilities reached the conclusion that the implementation of “refurbishment to enhance earthquake resistance,” “regular checkup” and “maintenance to resolve degradation” is prioritized. In FY2001, the method to effectively implement “maintenance to resolve degradation” was considered, and at the same time the degradation level of all facilities owned by the city was surveyed from FY2001 to FY2013, to prepare a long-term repair plan and degradation record cards.
(*Reference: 1-3 Compiling the degree of degradation and the progress of repair of public facilities, including school facilities, into a database)

Maintenance to resolve degradation

In FY2004, expenses necessary for the next 30 years in order to use facilities without a problem throughout their lifetime were explained to the municipal assembly. As a result, the necessity of maintenance to resolve degradation was recognized and the planned maintenance to resolve degradation started in full scale from FY2005, based on the results of a survey on the degraded elements and devices of all facilities. [Figure 1]

Figure 2: Left: Leaking toilet pipework; Right: Toilet after maintenance and repair

3: Points of special attention

A development plan is prepared every year and evaluated and prioritized with scores, so that anyone can be convinced of its validity.

4: Achievements and problems

Introduction of planned maintenance to resolve degradation allowed for the implementation of facility development based on the premise of planned maintenance. It also became possible to improve and maintain all facilities at the same level regardless of the departments mainly in charge of their management. It is also a major achievement that it became possible to secure a larger budget than before, with the maintenance to resolve degradation being recognized throughout the city office, via the Research Committee on the Public Facilities Improvement Plan, which is a city-government-wide committee to consider the basic policy of facilities development in the future. [Figure 2]

As a result of the implementation of planned maintenance, expenses for corrective maintenance are actually being reduced significantly, and it is considered that efforts have started toward the implementation of the adequate maintenance of facilities.

There is no end to the maintenance to resolve degradation, as long as a facility exists. It is desirable to keep on making proposals on measures that are even more suited to the current situation when preparing the development plan every year.

Figure 1: Changes in the budget for maintenance

(After 2005, when the importance of maintenance became common understanding and the operation of maintenance was introduced, expenses for maintenance implementation are included in the budget.)

Indoor gymnasium after refurbishment

2-2

Renewal of the structural building frame through countermeasures against neutralization

Fukuoka Prefecture

Yame City Fukushima Junior High School

Figure 1: Before refurbishment

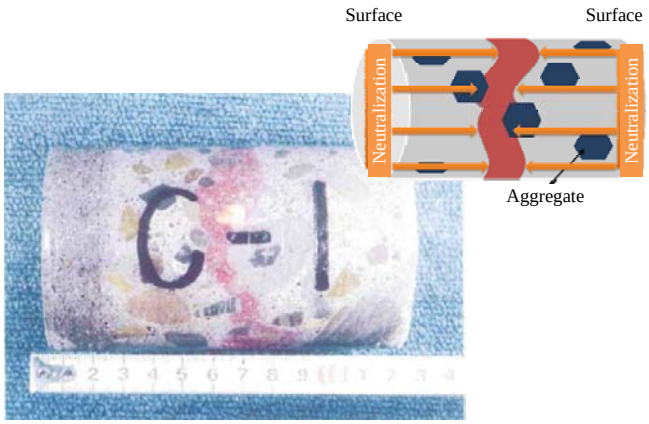


Figure 2: The result of spraying a test agent on the concrete before refurbishment
(The alkaline part turns red, indicating serious neutralization.)

1: Background

The indoor gymnasium at Yame City Fukushima Junior High School, constructed in 1961, was becoming very old and the safety of students' school life was being threatened by incidents such as falling wall mortar. However, because there had not been a sufficient budget for reconstruction, it was decided to implement large-scale remodeling after earthquake strengthening was applied, instead of reconstruction.

Upon implementing the project, an environmentally-friendly construction method was introduced. The building was first demolished entirely, other than structural elements such as pillars and beams, which were reused after the earthquake strengthening process was applied. [Figures 1 and 2]


Figure 3: Countermeasures against neutralization (Left: application of an agent to add an alkaline property. Right: application of an agent to prevent neutralization)

Figure 4: Scenes during refurbishment

2: Details of the effort

Countermeasures against the neutralization of concrete

The results of the on-site investigation of the indoor gymnasium showed that more than 90% of concrete parts more than 40 years old were neutralized. The existing pillars were mended with agents to add an alkaline property and to prevent neutralization, with three pillars at the center and six pillars on the left and right being reinforced with carbon material. No pillars were left bare; they were all finished by covering with thin cedar sheets, to prevent the impact of carbon dioxide as much as possible. [Figure 3]

Because this project also included earthquake strengthening work, earthquake resistance walls with braces made of concrete and reinforcing steel bars were put up in the four corners of the building in a well-balanced fashion, with the purpose of distributing horizontal force. With regard to pillars, a hypothesis that the structure is degraded by weathering was formed, and some axial forces were kept along the existing reinforced concrete pillars, while new round steel columns were added. [Figure 6]

Construction expenses

Countermeasures against neutralization (ascertaining the condition and taking measures): 8.66 million yen

Refurbishment expenses (excluding expenses for enhancing earthquake resistance): 161.18 million yen

Reuse of waste materials

The concrete debris generated when demolishing walls were reused for earthen floors. Base materials of the roof were also mended and reused.

In addition, floor materials that were used in the old indoor gymnasium were reused for the finish of interior side walls, including the earthquake resistance walls, for the effective utilization of resources and as a way to preserve the history and memories of the old gymnasium. [Figure 4 and 5]

3: Points of special attention

For the purpose of further increasing the durable lifetime, the building frame was protected from rain and wind damage with galvalume steel plates and wood, in addition to mending by applying agents to add alkaline property and to prevent neutralization.

4: Achievements and problems

It was possible to refurbish a facility that had been under a dangerous condition to a state similar to new construction. In addition to the quality of classes and extracurricular club activities being enriched, the opening of the facility was promoted to the regional community. Compared to new construction, the refurbishment achieved lower construction cost and lesser environmental load caused by industrial waste.

On the other hand, because skylights and large openings were applied to achieve a bright and clean gymnasium, problems such as too-bright sunshine and high room temperature were caused.

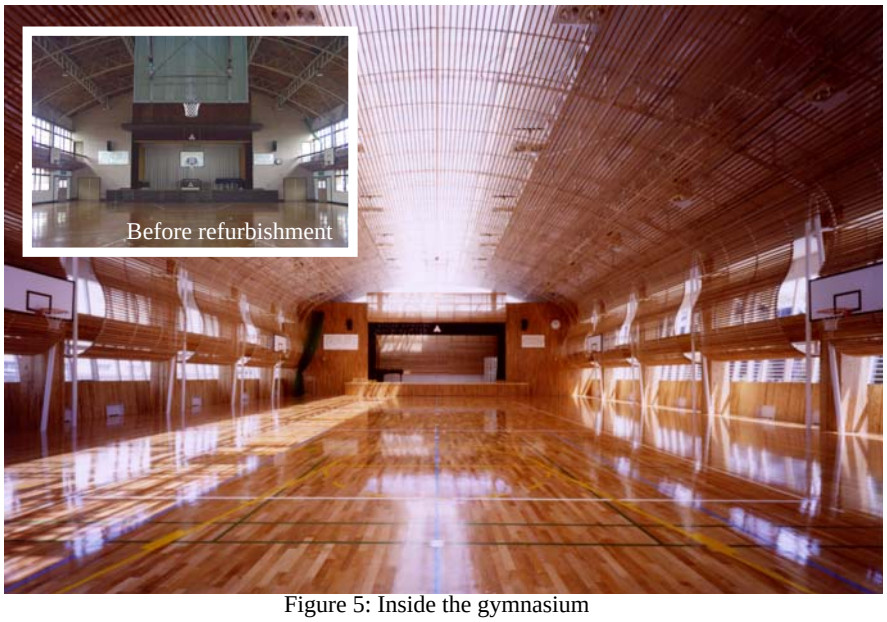


Figure 5: Inside the gymnasium

Figure 6:
Reinforced round steel column erected along the existing reinforced pillar

2-3
Shift to a plan ensuring the ease of maintenance and management

Kanagawa Prefecture

Chigasaki City

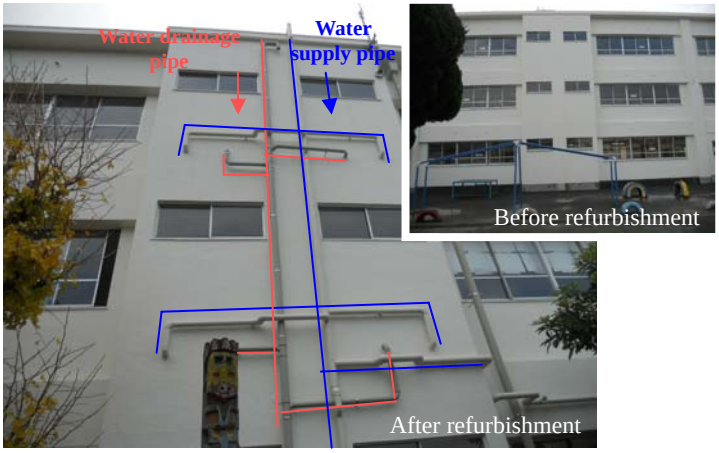
1: Background

Water leakage due to the progress of pipework corrosion occurs frequently after about 35 years have passed since the construction of a building. In particularly, repair of the water supply piping and fire hydrant piping embedded inside concrete floors and walls may require expenses for construction work in addition to the expenses for repairing the pipework itself, for reasons such as the difficulty of confirming the condition and identifying the point of leakage, or damage caused to floors and ceiling boards.

2: Details of the effort

Pipework was exposed during the large-scale refurbishment work of a school building to allow for the visual check of pipework. As for pipework in the ceiling, inspection openings are cut at the necessary parts of the ceiling.

It became possible to promptly detect where the water was leaking from. Pipework maintenance can now be implemented easily without construction work of demolishing floors and ceilings. ↗



Pipework exposed during the refurbishment of pipework for the sink at the corridor

3: Points of special attention

Because rainwater can easily enter from the outer wall, sealing work was fully confirmed during the refurbishment. Also, in order to retain the exterior appearance of the building, pipework of the same coloring as the outer wall was used, and the fire hydrant piping was also painted a similar color. It is important to use colors that do not damage the appearance of the building, apply louvers, and consider the alignment of pipework upon construction.

2-4
Use of materials considering durability

Yamanashi Prefecture

Kofu City

1: Background

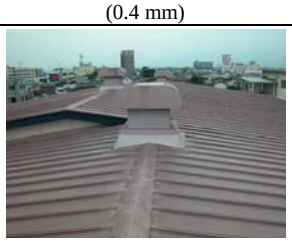
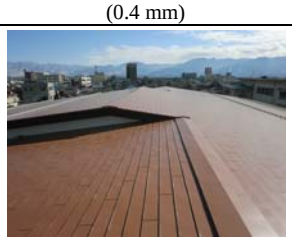
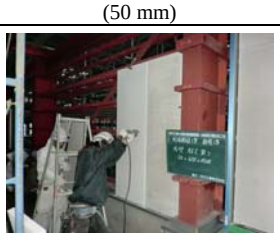
When enhancing the earthquake resistance of an indoor gymnasium, the major method of enhancement is to add a wall brace and roof brace to the existing reinforcing steel frame, so there it is necessary to remove wall and roof materials. Therefore, Kofu City implemented large-scale remodeling at the same time as enhancing earthquake resistance to ensure safety and improve the environment.

2: Details of the effort

Considering the recent fiscal conditions, it was assumed that facilities will continue to be used for a long time in the future. Therefore, materials with superior durability and allowing easier maintenance compared to conventional materials were used, and toilets were changed from a wet system to a dry system.

3: Points of special attention

It is difficult to streamline the selection of materials because there are no criteria about the level to which durability should be raised.

	Roof material		Outer wall material	
	Conventional	Materials with superior durability	Conventional	Materials with superior durability
Name of material	Colored galvanized steel plate (0.4 mm)	Colored Galvalume steel plate (0.4 mm)	Lath-mortar applied (25 mm)	Autoclaved light-weight concrete (50 mm)
Appear-ance				
Ease of process	○ Cut surfaces rust easily.	○ Cut surfaces rust easily.	△ It requires many processes, such as first coating, intermediate coating, and finish coating. It needs painting.	○ Cutting is easy. It needs painting.
Durability	Approx. 10–15 years	Approx. 20–25 years	Approx. 10–15 years	Approx. 20–25 years
Insulation	—	—	△	○
Mainten-ance	Necessary (repaint once every 5 or 6 years)	Necessary (repaint once every 10–15 years)	Necessary (repaint and mend cracks once every 5 or 6 years)	Necessary (repaint once every 5–10 years)
Cost	2,350 yen/m^2	2,430 yen/m^2	3,510 yen/m^2	4,680 yen/m^2

Examples of materials introduced by Kofu City

2-5
Improvement of the educational environment through environment-focused refurbishment

Hokkaido

Kuromatsunai Town Kuromatsunai Junior High School

"Light Path" constructed with refurbishment

1: Background

Kuromatsunai Town Kuromatsunai Junior High School refurbished its two-story school building made of reinforced concrete and one-story gymnasium made of structural steel, constructed in 1978, with the aim of continued use for the next 20 years.

From more than one year before the proposal was made for the selection of designers, the Committee on Environmental Education involving regional residents and the school, and the Committee on Environment-Focused Refurbishment for architectural engineers were held simultaneously.

These committees aimed to have the local residents and the school understand and utilize a flexible architectural model that takes into consideration the region's characteristics, such as the reduction of CO_2 emissions, improvement of earthquake-resistance performance, and the use of spare space according to the decline in the number of students, rather than having the countermeasures against deterioration as the sole purpose.

2: Details of the effort

Use of natural light (classrooms)

Because the school is in a region with a low percentage of sunshine, it was possible to adopt a lighting method without taking in excessive heat from roof glass. By taking in light from the sky stably through north-facing roof glass, it became possible to reduce energy used for lighting in classrooms on the second floor, which are used often. Because snowfall on the glass is melted by continuous heating, there is no problem with taking in natural light even in winter.

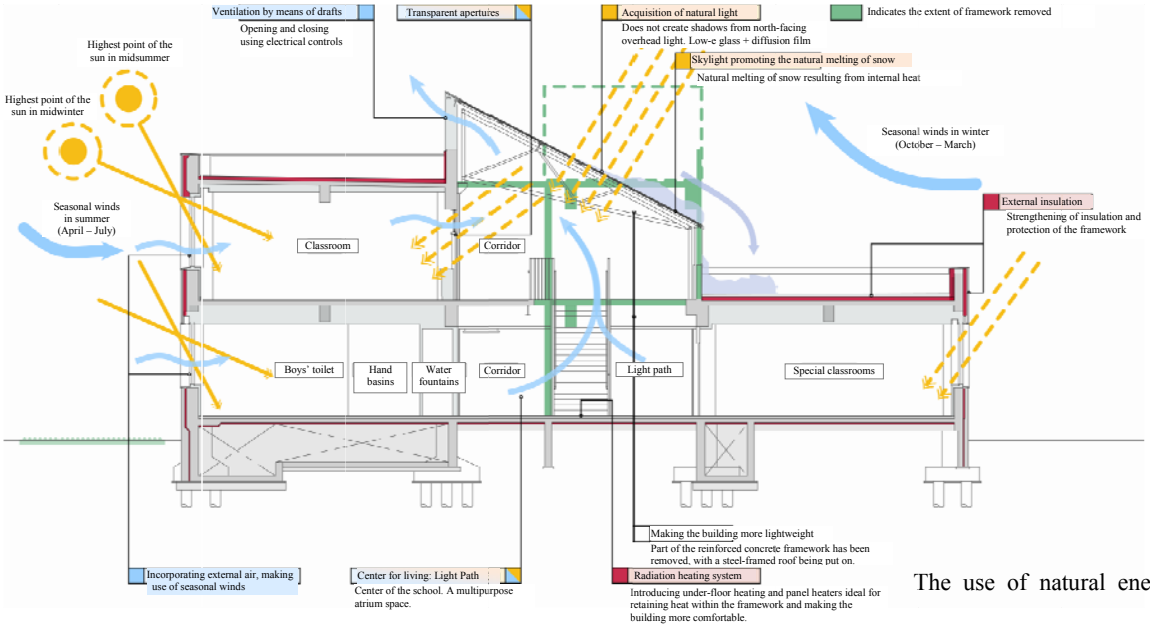
Natural ventilation utilizing seasonal wind

In the region, a cool breeze from the Pacific Ocean to the south in summer and a cold north wind from the Sea of Japan in winter tend to blow regardless of the time of day or night. By ensuring the route for natural ventilation to take in and discharge the south wind in summer, energy used for ventilation was reduced. At the same time, attention was paid to ensure heat insulation against the north wind in winter.

Exterior thermal insulation and life extension of building frame

The exterior thermal insulation method was applied to the outside of the existing concrete outer wall, using a metal plate and 100mm-thick glass wool. Resin sashes and low-ε pair glass were also used to reduce the heating load and the extension of the building frame's lifetime.

Regular classroom using lighting from two sets of windows



The use of natural energy

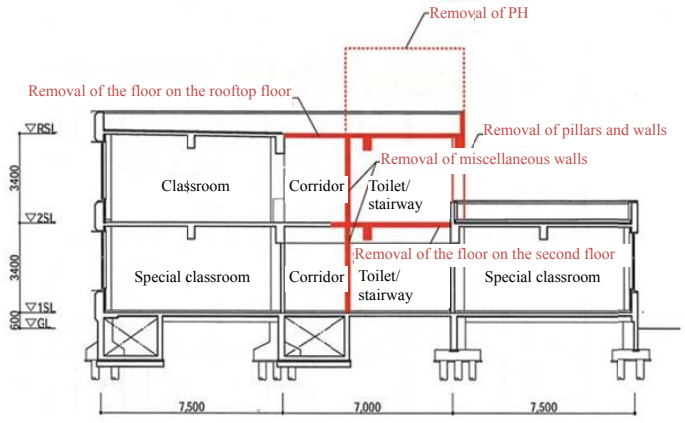
Improvement of educational environment by constructing the "Path of Light"

By demolishing the roof of the central part of the building and the building frame for the floor on the second floor, and covering them with a glass roof, "Path of Light," a two-story atrium space, was established. This not only contributed to reducing the lighting load with the use of natural light, but also provided a center for the day-to-day life of students, for instance being used for activities in collaboration with special classrooms. The space is also used for PTA meetings and other events.

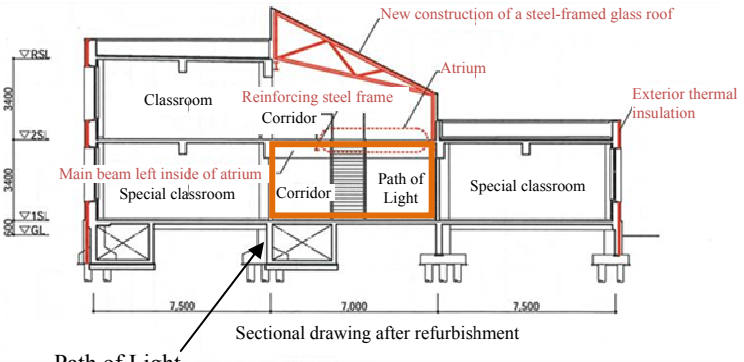
The entire facility turned into a bright and active space filled with natural light, and it appears that this space like a single large house gives a feeling of intimate unity and has a positive effect on the students' mood.

Further, this refurbishment reduced the weight of the building frame, resulting in a 20% improvement of the Is Figure, which is a seismic index of structure, and at the same time in the reduction of burden on the pile foundation.

Demolition of the part of the Path of Light



Sectional drawing before refurbishment



Sectional drawing after refurbishment

Path of Light

Sectional drawing before and after refurbishment

(Design period)

Proposal: From February 2006
Implementation and design: From April to July 2006
Construction period: From September 2006 to February 2007 (school building)

3: Points of special attention

The monitoring of consumed energy and consideration of the operational manual are being implemented on an ongoing basis after construction has finished, with the organizer of committees taking the initiative while also gathering advisors, school personnel, and designers. Also, a program on environment education is included and utilized within the curriculum.

Workshop on the environment

Before refurbishment

Top left: Classroom
Top right: Corridor
Bottom left: Entrance

2-6

Improvement of the educational environment through the use of wood materials produced within the region for building interiors

Saitama Prefecture

Tokigawa Town Tokigawa Junior High School

1: Background

Rebuilding deteriorated public facilities is expensive, causing a large fiscal burden. Therefore, Tokigawa Town provides a comfortable education environment with less expenses and shorter construction period through refurbishing facilities by strengthening them against earthquakes and using wood materials for interiors. (Compared to the new construction of a school building of the same size, relevant expenses can be held down to about 20% to 30%.)

This school building was constructed in 1971. Because its earthquake resistance was low and the inside was also deteriorating, strengthening work against earthquakes and the remodeling of interiors by using wood materials were implemented in 2006 and 2009 respectively.

Wooden lounge made by refurbishing the pantry

2: Details of the effort

In addition to strengthening against earthquakes and the use of wood materials for the interior, the exterior of the facility was also repainted and water-resistance processing was applied on the rooftop, to ensure an environment as good as that of a new construction.

The former pantry, which has not been used, was refurbished into a lounge for students. About 70% of the area of Tokigawa Town is covered with forests, and wood produced in Tokigawa was used as much as possible for major wood materials used for the interiors, which also revitalized the local industry.

3: Points of special attention

Cost was held down with measures such as the utilization of wood with gnarls, the use of plywood for ceiling parts out of sight, and the use of timber from forest thinning.

In addition, because the construction was implemented in a short period during summer vacation, floor material with rubber was used for the finish of mortar floors to eliminate the conventional process of applying plywood as a foundation, which contributed to shortening the construction period.

4: Achievements and problems

The humidity conditioning effect of wood materials worked to reduce the number of students catching a cold, and was also effective in preventing dew formation. It also contributed to ensuring safety with adequate resiliency that prevents serious injury when students fall over.

The wooden lounge established at the time of refurbishment is a space for showing information on training and proceeding to upper secondary schools, while also used as a relaxing space for students to talk to each other during breaks.

3. Formulation of a Mid- to Long-Term Plan

Points of the Indications in the Vision for Countermeasures against the Deterioration of School Facilities

○ Under the severe fiscal condition, it is important to implement development starting with facilities that really need it, based on a comprehensive and objective evaluation of school facilities so as to win the understanding of relevant parties and local residents on the policy of development.

○ It is important to formulate a mid- to long-term development plan setting forth the time and scale of refurbishment and reconstruction, and to implement development according to plan. Upon formulating a plan, it is important to make considerations while gaining the understanding and consent from the broad range of relevant parties.

Case Examples Shown

Introduced here are case examples of implementing prioritization of facilities to be developed by quantifying the degradation situation of facilities.

There are also case examples where efforts are made to level the fiscal burden and to share the common awareness of problems with regional residents, by formulating a mid- to long-term development plan of public facilities while also taking into consideration the forecast on demographic changes and fiscal conditions in the future.

3-1 Tachikawa City (Tokyo)	Prioritizing based on objective evaluation indices
3-2 Nagoya City (Aichi Prefecture)	Setting the targeted durable lifetime (80 years)
3-3 Hirakata City (Osaka Prefecture)	Forecast of the maintenance and management expenses related to school facilities for the next 20 years
3-4 Odawara City (Kanagawa Prefecture)	Participation by parents and local residents in formulating the plan
3-5 Utsunomiya City (Tochigi Prefecture)	Plan for the lifespan extension of facilities and compiling a database on the conditions of facilities
3-6 Saitama City (Saitama Prefecture)	Formulation of a management plan for public facilities

3-1

Prioritizing based on objective evaluation indices

Tokyo

Tachikawa City

1: Background

In order to aim for the improvement of the facility environment, flexibly respond to changes in the socioeconomic environment, and actively implement new administrative measures under the severe fiscal condition, it is necessary to allocate limited financial resources efficiently and effectively. As for public facilities, it is required to formulate a feasible plan based on the situations of the facilities and maintain them adequately and favorably as places for providing services for citizens, while also reducing costs, in order to extend their lifespan and implement refurbishment and reconstruction adequately.

2: Details of the effort

Implementation of a survey on degradation

Based on the history of refurbishment, information on regular checkups, and the results of interviews with administrators and on-site surveys, the degree of degradation was evaluated in four levels, from A to D. Points for individual elements were calculated by multiplying the evaluation index score of the element and the importance factor by each element. The average of the points for individual elements was considered as the present degree of degradation. [Figures 1 and 2]

Prioritizing according to the comprehensive degradation degree

The score for each facility was calculated with the present degree of degradation and the age of the facility to prioritize the facilities to which the maintenance plan is applied. When there is more than one wing in the facility, the average of all wings was used for evaluation. [Figure 3]

Present degree of degradation $= \dfrac{\sum (\text{Score of evaluation for each element (Table 1)} \times \text{Importance factor of the element (Table 2)})}{\text{Number of elements}}$

Table 1: Evaluation index score

A	Generally good	10
B	Aged degradation found in some parts	40
C	Aged deterioration found in general	70
D	Degradation/malfunctioning that require prompt measures	100

Table 2: Importance factor

Importance in facility management - Impact on ensuring the safety and function of the entire building	Large	1.0
	Moderate	0.75
	Small	0.5
	Minor	0.25

Figure 2: Calculation of the present degree of degradation

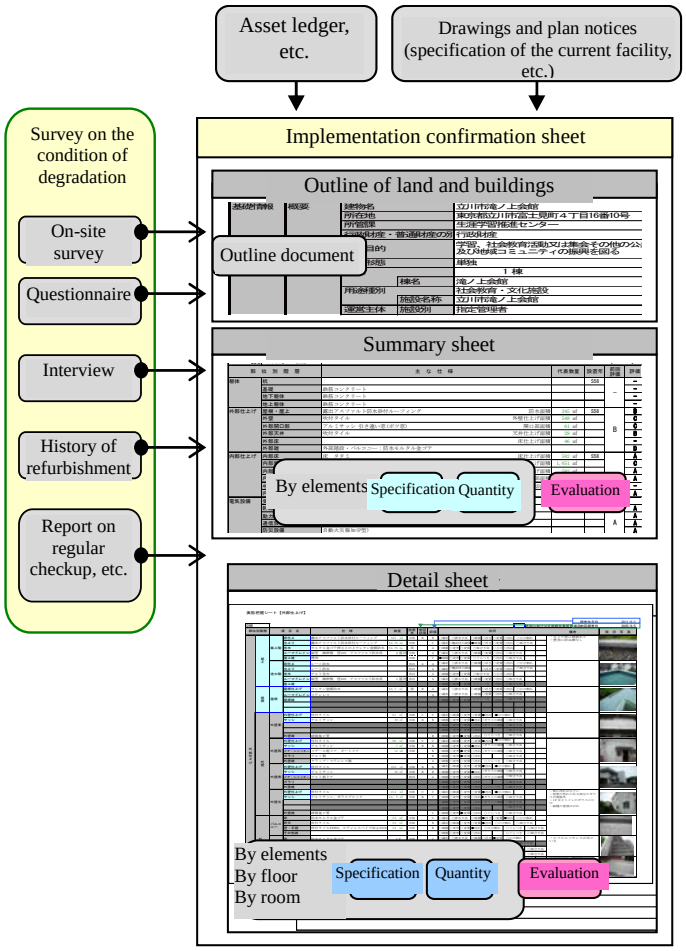


Figure 1: Sheet for understanding the condition of degradation

Element		Evaluation	Evaluation points	Importance factor of the element	Points of the element
Exterior finishing	Roof, rooftop	B	40	0.775	30
	Outer wall	C	70	1	70
	Outer opening	C	70	0.5	35
	Outer ceiling	B	40	0.5	20
	Outer floor	—	0	0.25	0
	Exterior miscellaneous facilities	D	100	0.25	25
Interior finishing (by room)	Interior floor	A	10	0.25	2.5
	Interior wall	C	70	0.25	17.5
	Interior ceiling	A	10	0.25	2.5
	Interior opening	A	10	0.25	2.5
	Intermediate assemblies	B	40	0.25	10
	Interior miscellaneous facilities	A	10	0.25	2.5
Electric facilities	Electricity receiving and transformation facilities		0	1	0
	Arterial facilities	A	10	1	10
	Power, electricity and plugs	A	10	0.5	5
	Telecommunication facilities	A	10	0.5	5
	Disaster prevention facilities	A	10	1	10
Smoke exhaust facilities	Air conditioning facilities	C	70	0.75	52.5
	Ducts	—	0	0.75	0
	Pipework	—	0	0.75	0
	Ventilation facilities	B	40	1	40
	Smoke exhaust facilities		0	0.75	0
	Other air conditioning and ventilation facilities		0	0.25	0
Other facilities	Elevators	A	10	0.75	7.5
	Mechanical parking facilities		0	0.25	0
	Other facilities		0	0.25	0
	No. of evaluated elements		19	Total	410
	Present degree of degradation		410÷9		21.1
	Age of facility				28.0
	Comprehensive degree of degradation		**21.1+28**		**49.1**

Comprehensive degree of degradation = Present degree of degradation + Age of facility

Figure 3: Calculation of comprehensive degree of degradation

Importance of facilities

The importance of facilities is set from the perspectives of using them as emergency bases at the time of disaster, evacuation centers, and supply and treatment facilities that are indispensable for living, based on the disaster prevention plan. Consideration of the safety and convenience of the facility at the time of a disaster is also considered by setting three levels of priority, namely I (city government halls and temporary evacuation centers), II (secondary evacuation centers and evacuation centers for people requiring special care), and III (others) in the order of higher priority. [Figure 4]

Judgment of the priority of maintenance

The ultimate priority of maintenance is judged by multiplying the comprehensive degree of degradation and the importance of the facility. Facilities are divided into groups from 1 to 6 according to the level of priority, and the results are shown in a matrix table. The priority becomes lower from 1 to 6. Within the same group, facilities with higher points for the comprehensive degree of degradation have higher priority. [Figure 5]

3: Points of special attention

As for the evaluation of indices from A to D used when calculating the comprehensive degree of degradation, evaluation indices are made so that the evaluation will not show disproportion to A or D, and the difference of scores are shown clearly. Estimation was made to avoid disproportion of the final evaluation with the comprehensive degree of degradation and the age of facility. The ratio of the scores of the present degree of degradation to the median age of facility is set at 1:1.

4: Achievements and problems

Favorable maintenance and management were realized by implementing a survey on the condition of degradation, and accumulating materials for the survey and managing them in a uniform fashion. In addition, by scoring the degradation of facilities, it became possible to judge the specific priority. Further, by adding the factor of the importance of facilities, the prioritized facilities are made clear in an even more objective fashion.

The problem is that a regular survey is needed because the degradation of facilities does not progress at an equal pace. Tachikawa City will be reviewing specific plans, including the priority of maintenance, once every five years.

Importance	Classification	No. of buildings
I (high) (City government hall) (Temporary evacuation center)	City government halls Elementary and lower secondary schools Supply and treatment facilities	34 buildings
II (medium) (Secondary evacuation center) (Evacuation center for people requiring special care)	Study halls Facilities jointly used for study and similar activities Nurseries, child centers, etc. Welfare halls, welfare workshops, etc. Gymnasiums for citizens Old city government halls, branches of fire corps	63 buildings
III (low) Other	Museum of History and Folklore, etc. Citizens' halls Training halls for martial arts Regional service centers, etc. Contact bases, etc. Parking spaces, gathering places, etc.	23 buildings

Figure 4: Importance of facilities

Importance of the facility	Comprehensive degree of degradation: I (more than 65)	II (55–65)	III (45–55)	IV (less than 45)
I (high)	Priority: 1st 14 buildings	Priority: 3rd 12 buildings	Priority: 3rd 3 buildings	Priority: 4th 5 buildings
II (medium)	Priority: 2nd 5 buildings	Priority: 3rd 13 buildings	Priority: 4th 16 buildings	Priority: 5th 29 buildings
III (low)	Priority: 3rd 0 buildings	Priority: 4th 4 buildings	Priority: 5th 4 buildings	Priority: 6th 15 buildings

Figure 5: Judgment of the priority of maintenance

3-2

Setting the targeted durable lifetime (80 years)

Aichi Prefecture

Nagoya City

1: Background

In order to cope with the deterioration of buildings established by Nagoya City, the city formulated the Nagoya City Basic Principles on Asset Management and the Nagoya City Asset Management Promotion Plan, which provide for efforts in holding down and leveling expenses for facilities development through the lifespan extension of schools and other facilities and the adequate use of assets possessed by the city.

Although reconstruction had been implemented for facilities about 40 years old before, school buildings over 40 years old now account for about one fourth of the total facilities. Under the severe fiscal condition, which is expected to continue in the future, it may be difficult to reconstruct all these facilities, and the city is considering another method of facility development instead of reconstruction.

2: Details of the effort

Setting the level of durable lifetime at 80 years

In general, the corrosion of reinforcing bars will progress in line with the progress of neutralization. Therefore, it is generally recognized that the durable lifetime of reinforced concrete buildings is about 60 to 65 years. However, according to the survey implemented by Nagoya City, corrosion of reinforcing bars was not necessarily found in buildings where the concrete is neutralized. The degree of corrosion was generally in line with the progress of neutralization, and it became clear that there are facilities that can be expected to be durable for about 80 years.* According to the survey results as of FY2011, about 30% of buildings 40 years old or older were found as usable for about a further 40 years. Therefore, with a target of use set at about up to 80 years, the city started efforts in extending the lifespan of buildings. [Figure 1]

(Unit: buildings)

Classification	Period of expected use in the future			
	About 40 years or more	About 20 years or more	Less than about 20 years	Total
Schools	82	237	2	321

About 30% of the buildings are durable for 80 years or more

Figure 1: Results of the survey on structural durability (up until the survey for FY2011)

Introduction of renewal refurbishment

In order to use facilities for about 80 years, the concept of “renewal refurbishment” was introduced to replace reconstruction. This is a method while leaving the structure of the building as is, interior and exterior refurbishment, renewal of equipment instruments, and improvement of barrier-free access are implemented for facilities about 40 years old, in order to ensure the educational environment that is currently required. [Figures 2 and 3]

In addition to renewal refurbishment, large-scale remodeling that mainly includes the interior and exterior refurbishment will be implemented at about 20 years from reconstruction and renewal refurbishment, to extend the lifespan of facilities and to reduce and level the expenses for development.

Method used to evaluate the survey results in the case of Nagoya City

Corrosion of reinforcing bars, neutralization of concrete, and the amount of chloride in the concrete are evaluated in four ranks, and are combined to judge whether the extension of lifespan can be expected. Upon doing so, the corrosion of reinforcing bars that may directly cause the deterioration of structural durability is focused on.

Durability index		Corrosion of reinforcing bars: I. Virtually none	II. Minor	III. Moderate	IV. Severe
Neutralization of concrete	I. Virtually none				
	II. Minor				
	III. Moderate				
	IV. Severe				

	With relatively low degree of degradation, it is evaluated that lifespan extension can be expected.
	The durability may deteriorate in the future due to the corrosion of reinforcing bars, but it is evaluated that the facility may be used for a sufficiently long period.
	Because the corrosion of reinforcing bars, which directly causes the deterioration of durability, is relatively serious, it is evaluated that lifespan extension cannot be expected.

* When the amount of chloride is more than a moderate level, there is a risk that the corrosion of reinforcing bars will progress rapidly in the future. Therefore, regardless of the degree of the corrosion of reinforcing bars and the neutralization of concrete, it is evaluated that little lifespan extension can be expected (only in coastal areas).

3: Points of special attention

- It is necessary to further consider specifically what kind of renewal refurbishment will become necessary.
- There are many facilities where sufficient refurbishment is not implemented in a timely manner, such as facilities older than 30 years but left without large-scale remodeling. A long-term plan will become necessary for leveling the reduction of expenses for development, such as what facility will be refurbished at what time for how many years.

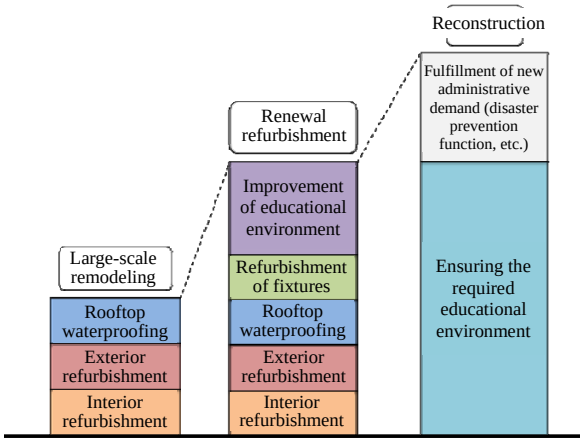


Figure 2: Comparison of large-scale remodeling, renewal refurbishment and reconstruction

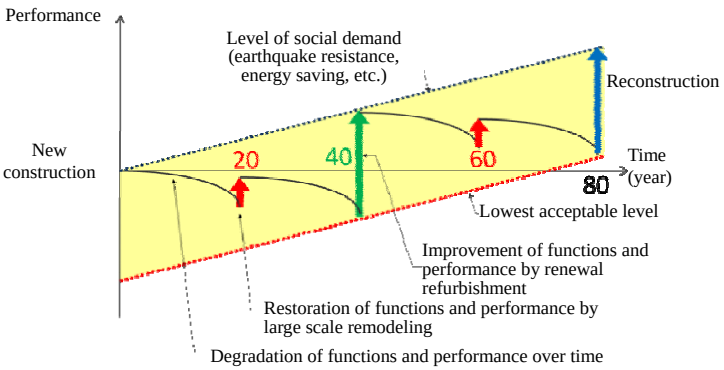


Figure 3: Conceptual diagram of lifespan extension through renewal refurbishment

3-3

Forecast of the maintenance and management expenses related to school facilities for the next 20 years

Osaka Prefecture

Hirakata City

1: Background

In response to the rapid population increase after the mid-1950s, Hirakata City has been developing many buildings, including schools and kindergartens and welfare facilities. However, a considerable time has passed since many of them were constructed, and it is expected that large-scale refurbishment will intensively occur from now on.

Under such situation, the Maintenance Plan for Buildings Possessed by Hirakata City was formulated with an aim to maintain the safety and functionality and extend the lifetimes of buildings possessed by the city, as well as to implement planned refurbishments while understanding the future forecast of expenses necessary for maintenance and repair and leveling the fiscal burden.

2: Details of the effort

Outline of the plan

(1) Targeted facilities: Facilities used mainly by citizens, such as city government offices, branches, lifelong learning centers and nurseries: 81 facilities, 106 buildings
(Total floor area of 182,200 m^2)
Schools and kindergartens: 75 facilities, 392 buildings
(Total floor area of 413,500 m^2)

(2) Period: From FY2011 to FY2030
(For 20 years)

(3) Expenses for maintenance: Approx. 40 billion yen
(Estimation for the total 20 years)

Formulation method of the plan

This plan summarizes the timing and estimated expenses of refurbishment and renewal of each element of the targeted buildings held by the city, based on the ages and the degradation conditions of such buildings and considering the period of refurbishment cycle and maintenance and repair expenses. The plan was formulated according to the following procedure.

(1) Preconditions

a. The maintenance of the basic functions of facilities is the first principle, and reconstruction, addition of new functions and changes in use are not included.
b. Facilities with already fixed schedule for reconstruction, closing, consolidation and renewal, and facilities with simple structure, such as warehouses, are maintained by applying the minimum necessary refurbishment on an ongoing basis.

(2) How to decide the timing and expenses of refurbishment/renewal

a. The existence of elements (buildings, electric facilities and mechanical appliances) and the necessity of renewal thereof are checked in detail for each facility.
b. Expenses for refurbishment and renewal are calculated, generally based on expenses necessary for newly constructing each element.
c. Timing of refurbishment and renewal are set for each element according to the specification.
d. Expenses for each of 20 fiscal years in the future are calculated for each facility.

(3) Method to level the expenses

a. Expenses calculated for each facility are aggregated to clarify the increase/decrease of expenses for each fiscal year.
b. Degree of the deterioration of each element based on the survey on deterioration is evaluated and the priority of construction work is surveyed closely, so as to level the difference of expenses for each fiscal year.
c. Implementation of the refurbishment and renewal of elements is allocated for each fiscal year according to the priority.
d. Schedule is adjusted, such as implementing construction works of similar type at the same time as much as possible.
e. Based on above, the maintenance plan of all the targeted buildings possessed by the city is summarized.

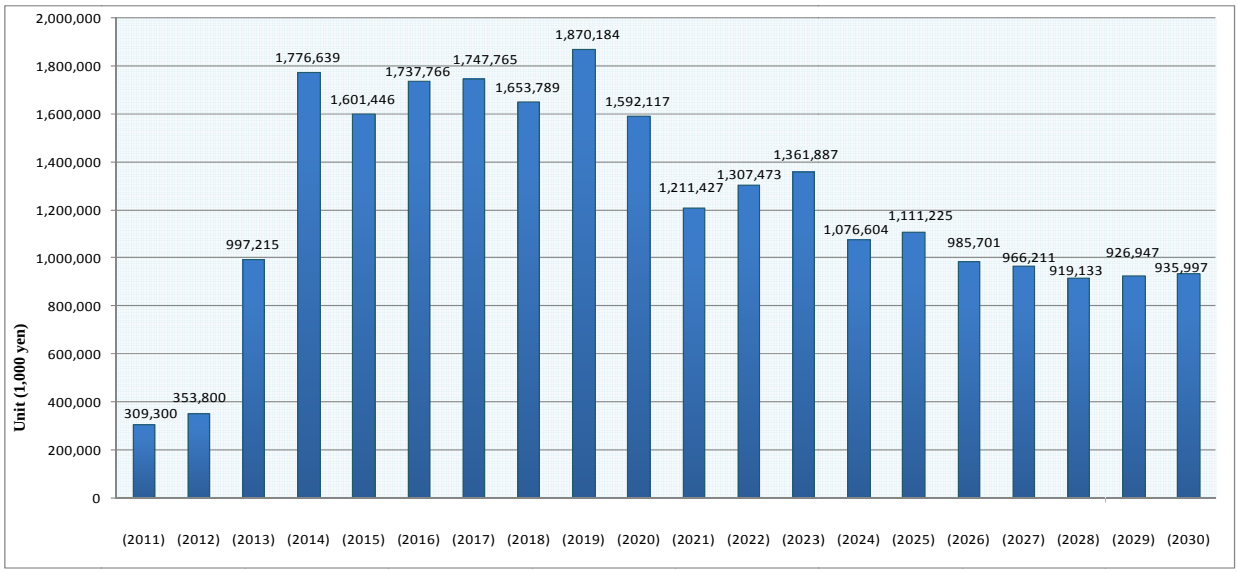


Figure 1: Maintenance expenses for school facilities over the next 20 years (transition)

Maintenance expenses for school facilities

The above chart shows changes in maintenance expenses for elementary and lower secondary schools, school lunch centers, and After-school Childcare Room for Working Parents (66 facilities, 376 buildings in total), in the next 20 years.

Maintenance expenses necessary for these school facilities over the next 20 years is about 24.4 billion yen in total (1.22 billion yen per year on average). [Figure 1]

3: Points of special attention

This plan also includes the ascertaining of the current status and the history of the construction work of targeted buildings possessed by the city, based on the resource research and survey on aging (on-site survey), the construction of a database of relevant information by introducing the planned maintenance system, and the Analytic Hierarchy Process (AHP).

Consequently, the plan's effectiveness is sufficiently ensured, and the plan is feasible in terms of financial resources, by understanding the future forecast of maintenance expenses and leveling the financial burden.

On the other hand, even if financial resources are secured according to this plan, if the system to implement it is underdeveloped, it means the feasibility of this plan would be unsecured. Therefore, personnel responsible for the maintenance of all the buildings possessed by the city will be appointed as the organization to promote the plan. [Figure 2]

In addition, the efficiency of design work will also be improved through measures such as outsourcing and the utilization of the various forms of job appointment of the city.

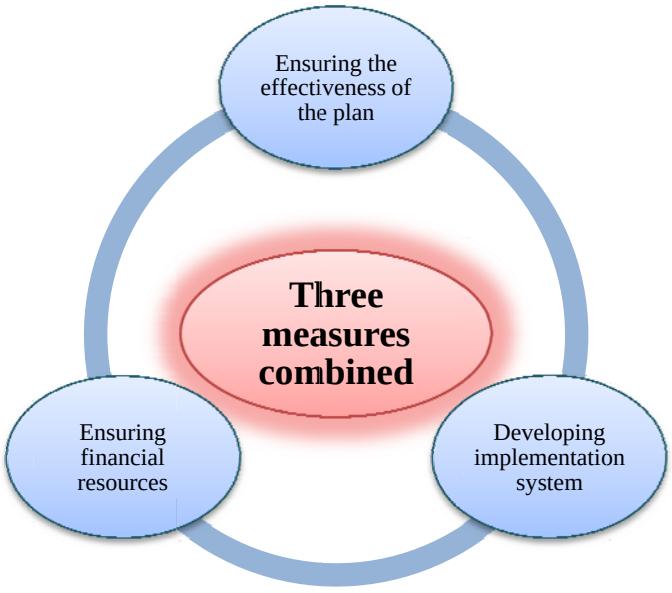


Figure 2: Image of implementing lifespan extension

3-4

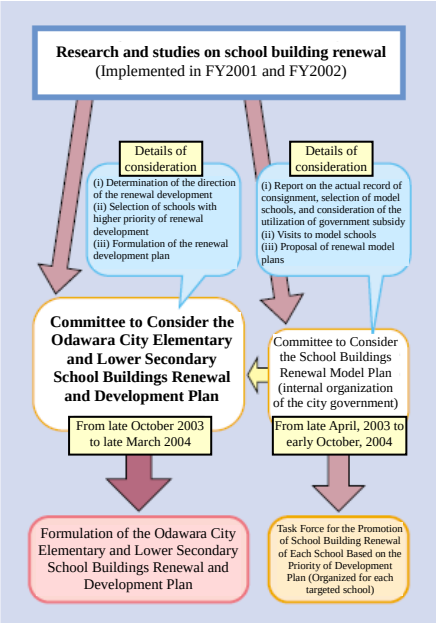
Participation by parents and local residents in formulating the plan

Kanagawa Prefecture

Odawara City

1: Background

Since 1987, Odawara City has been sequentially implementing construction work to enhance the earthquake resistance of existing school buildings. Before the formulation of a renewal plan in 2003, there were only four schools left. On the other hand, because many of the school buildings possessed by the city were 15 to 40 years old, it was necessary to consider the improvement of the quality of facilities for the utilization of existing school buildings, and to review them as facilities for local use, in parallel with construction work to enhance earthquake resistance. Therefore, consideration of the renewal development plan of school buildings started from 2000.



Flow of renewal

2: Details of the effort

Committee to Consider Odawara City Elementary and Lower Secondary School Buildings Renewal and Development Plan (hereinafter referred to as the “Committee”) was held five times from October 2003 to March 2004, and the Odawara City Elementary and Lower Secondary School Buildings Renewal and Development Plan was formulated.

(Committee members)

- Directors of the Association of Communities
- Chairperson of the PTA Liaison Council
- Chairperson of the principals’ committee
- Chairperson of the vice-principals’ committee
- Director and Deputy Director of the School Education Department
- Two external academic experts
- Social education staff
- School councilors

(Observers)

- Chief of the School Education Section
- Chief of the School Health Section
- Assistant Chief of the Lifelong Learning Section
- Chief of the Construction Section
- Principal Staff Member in Charge of the Construction Section
- Two Principal Staff Members of the Construction Section
- Principal Staff Member of the Planning and Policy Section
- Chief of the Educational General Affairs Section
- Principal Staff Member in Charge of the Educational General Affairs Section
- Two Principal Staff Members of the Educational General Affairs

3: Points of special attention

There were opinions representing the participating organizations from the head of each organization. Consideration was repeatedly given to incorporating the broad spectrum of opinions from different organizations into the plan.

4: Achievements and problems

With the participation by teachers and other personnel, parents, and local residents, it was possible to go over the plan by considering the nature of school education and regional characteristics. In addition, it was also possible to receive much advice from technical perspectives through the participation of academic experts.

In addition, because the implementation of the development plan is delayed while the deterioration of schools that are not the target of the plan is progressing, Odawara City is currently reviewing the development plan. This review is focused on the refurbishment and repair due to the deterioration of facilities, and discussion by the staff of the department in charge of facility management and construction is being held.

COLUMN >>> Extending the Lifespan of School Buildings Made of Wood

Ehime Prefecture

Yawatahama City Hizuchi Elementary School

The wooden school building constructed in the late 1950s is more than 50 years old and the deterioration is serious. Therefore, refurbishment was implemented to provide a modern educational environment and ensuring safety while not lessening the historic and cultural values.

By paying full attention to the design at the time of construction, sufficient earthquake resistance was ensured, partial corrosion and cracks were repaired, and the interior was refurbished, to fill the school with natural light and make it easy to be utilized by local residents.

City government and architects involved in the project won the 2012 World Monuments Fund/Knoll Modernism Prize, which is an award offered by an NPO in the U.S. to architects and designers who contributed to the restoration and preservation of endangered works of modernism. It is also designated as one of the National Important Cultural Properties.

Countermeasures against deterioration is not limited to buildings made of reinforced concrete, but can also be applied to buildings with a framework made of steel or those made of wood. This is a case example of a 50-year-old wooden school building renewed through refurbishment.

Appearance (after refurbishment)

Interior (after refurbishment)

3-5

Plan for the lifespan extension of facilities and compiling a database on the conditions of facilities

Tochigi Prefecture

Utsunomiya City

1: Background

Utsunomiya City has 692 facilities (3,550 buildings) of public buildings in total as of the end of FY2011. Among them, 60% were 20 years old or older, and nearly 30% were 30 years old or older. Repair expenses were growing as a large burden.

Therefore, the conventional style of repairing or rebuilding when broken was changed substantially into the idea of using the building for the long term under planned renewal.

2: Details of the effort

Plan for the Promotion of the Lifespan Extension of Public Buildings

The Basic Policy for the Lifespan Extension of Public Buildings was planned in 2003 in order to reduce the expenses for refurbishment.

Thereafter, also based on social requests such as the reduction of CO_2 emissions in line with issues such as global warming and environmental problems becoming apparent, the basic policy was decided in 2010. Further, in February 2011, the Plan for the Promotion of the Lifespan Extension of Public Buildings was formulated to realize the basic policy.

This plan is for extending the lifespan of buildings by implementing the refurbishment according to plan. First, a plan for five years from FY2011 to FY2015 was formulated. The estimate shows that the life cycle cost can be significantly reduced through long-term use under constant maintenance compared to the case where the building is rebuilt in 30 years. One rough estimation is to use a building made of reinforced concrete for 65 years after construction.

System to support planned maintenance

This system is for prioritizing the degree of the urgency of renewal in four grades from A to D, by considering the details of the year of the establishment, degree of degradation, history of construction work, and the malfunctioning found in on-site surveys and firefighting equipment inspections of building elements and equipment instruments for the 330 facilities of buildings owned by the city, and by managing and updating the data in a uniform fashion. [Figures 1 to 3]

The priority is designated in further detail within the same grade, according to the flow chart.

3: Achievements and problems

The estimated amount of refurbishment expenses is visualized for a few years in the future to contribute to easier refurbishment planning and the leveling of the budget.

	Details	Criteria for judging urgency
A	Urgent	(i) There is a serious problem in the major structure due to causes such as land subsidence, and urgent measures such as reinforcement are necessary. (ii) There is a danger of accident causing injury or death due to falling parts at a section that is used regularly. (iii) Water is leaking from the roof, outer wall, or external fixtures - There is a water leak in the office (including a storage area for important documents), computer room, electric room, telephone switchboard room, or rooms used by the general public at the time of normal rainfall, and where partial repair is impossible. (iv) Where improvement is required under laws, ordinances, administrative guidance, etc. - Refurbishment of water supply facilities judged as unsuitable for drinking - Firefighting equipment with deteriorated function due to aging (v) The major devices of equipment are deteriorated notably and problems are occurring frequently. (vi) The building element or equipment instrument is in place at the time of renewal and the damage loss degree score is 100. (vii) The building element or equipment instrument is in place at the time of renewal and there is a necessity for early renewal other than in the case of (vi). (viii) Other urgent cases with the necessity of taking measures within the fiscal year in question.
B	Needs prompt implementation	(i) It is the timing for the renewal of the building element or equipment instrument and there are malfunctions pointed out in maintenance inspections outsourced or found out through insulation resistance tests (ii) It is the timing for the renewal of the building element or equipment instrument but the period of construction must be considered in coordination with other construction work. (iii) Other cases where measures should be implemented promptly.
C	No need to hurry	(i) It is the timing for the renewal of the building element or equipment instrument but no malfunctions are pointed out in maintenance inspection outsourced or found out through insulation resistance tests, and the renewal timing can be postponed. (ii) It is the timing for the renewal of the building element or equipment instrument but the period of construction should be postponed in coordination with other construction work (iii) Other cases where there is no need to hurry the implementation.
D	Other, such as implemented during repair construction	(i) Construction work is already scheduled to be implemented or finished within the fiscal year. (ii) The renewal is minor and can be handled with repair work. (iii) Other cases where it can be handled with repair work.

- This criteria is prepared based on the criteria for judging urgency set for the opinions on the building planning of the Ministry of Land, Infrastructure, Transport and Tourism (*KokuEiKei* No. 27, Decision by the Director-General, Government Buildings Department, Minister's Secretariat on July 14, 2006)

Figure 1: Criteria for judging the urgency of the repair plan

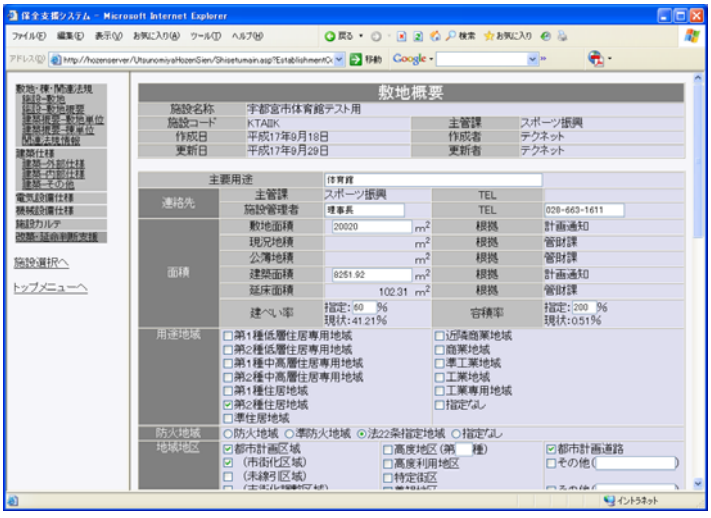


Figure 2: Facility information system (sample screen)

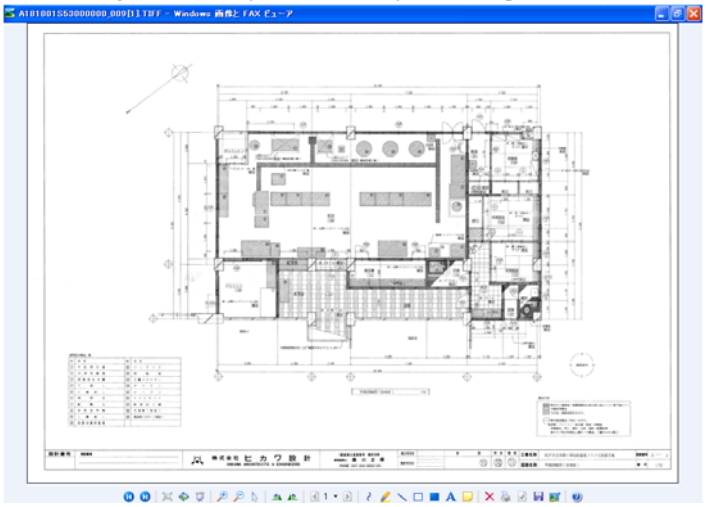


Figure 3: Drawing management system (sample screen)

3-6
Formulation of a management plan for public facilities

Saitama Prefecture

Saitama City

1: Background

The deterioration of public facilities is progressing in Saitama City, and many of them will reach the time for refurbishment or renewal soon. In order to provide safe, secure and sustainable facility services by effectively utilizing public facilities from a city-wide, comprehensive perspective and leveling the financial burden, efforts related to the management of public facilities have begun.

2: Details of the effort

Analysis of the current state of public facilities of the city and the disclosure of results

Upon formulating the plan, the state of the city's public facilities was studied and analyzed as follows. These data were summarized in the White Paper on Public Facilities Management, which was the first effort by a city designated by government ordinance.

- Situation of Saitama City

The total population of the city is about 1.23 million (as of 2011). It is expected that the trend of the aging society with fewer children will progress most rapidly among the cities designated by government ordinance in Japan, and the population will start decreasing by around 2015 to 2020.

- Current situation of public facilities

Saitama City has more than 1,700 public facilities, with a total floor area of about 2.6 million m^2. Among them, school and educational facilities account for about half. Many of the facilities were developed during the period from the late 1960s to the early 1980s, and it will become necessary to implement large-scale refurbishment and reconstruction according to the degree of deterioration in the future. [Figures 1 and 2]

As for schools (165 schools), there are 16 facilities aged 50 years old or older, 69 facilities aged 40–50 years old, and 61 facilities aged 30–40 years old. Therefore, early consideration of countermeasures against deterioration will become necessary.

- Current fiscal condition and problems

Considering the case where public facilities including infrastructure are refurbished and renewed at the current scale, the total project cost for 40 years is estimated as about 2.787 trillion yen, with an annual average of 69.7 billion yen.

When converted into the general account budget, the burden is estimated as approximately 1.13 trillion yen in 40 years, and 28.3 billion yen per year on average. This is about 2.2 times larger than the amount of refurbishment and renewal expenses in the budget for FY2011 (12.8 billion yen), and will cause a vast shortage in financial resources of about 15.5 billion yen. That is, if the invested amount is unchanged, only 45% of current facilities can be maintained. [Figure 3]

Project expenses for the refurbishment and renewal of schools in the next 40 years will be 21.9 billion yen per year on average, which is about 3.6 times larger than the cost for FY2011 (6.1 billion yen).

School and educational facilities (in green) were the majority in the period from the late 1960s to early 1980s.

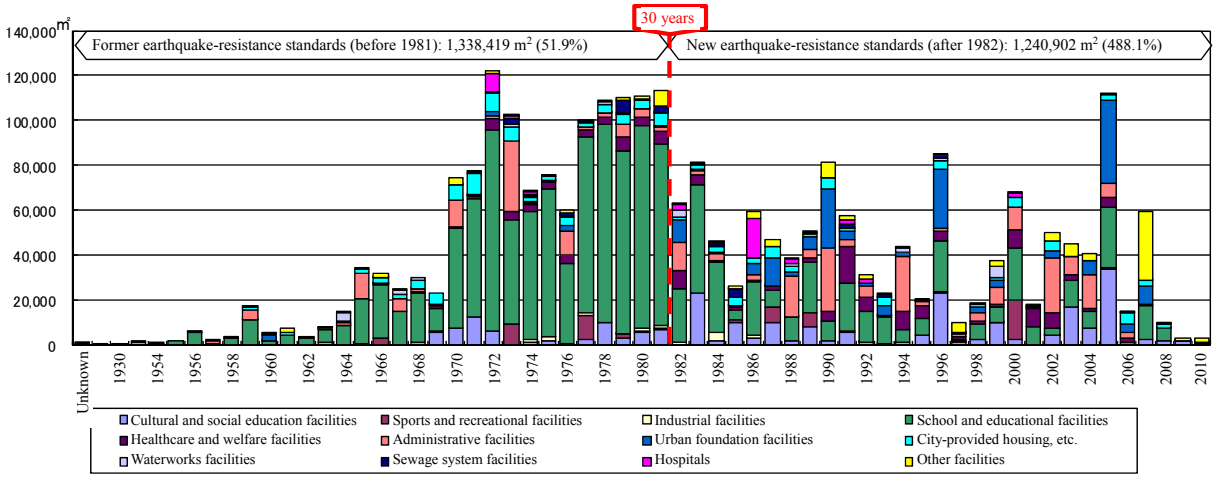


Figure 1: Total floor areas of public facilities by the year of

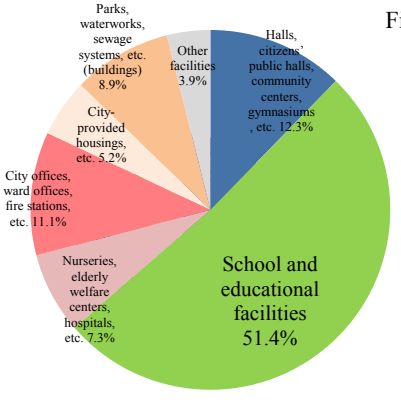


Figure 2: Breakdown of the floor areas of buildings by genre

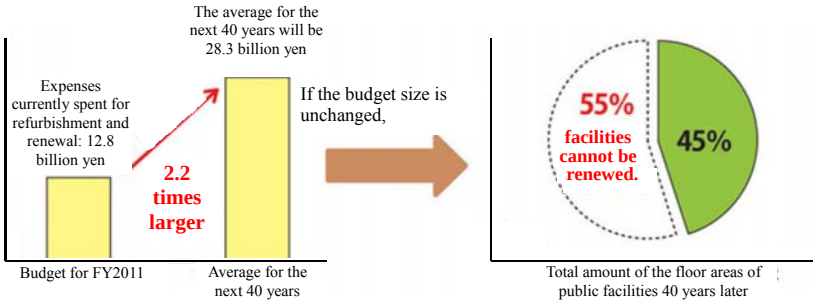


Figure 3: Comparison of the current situation with the average of 40 years later

Formulation of the Saitama City Public Facilities Management Plan

Saitama City Public Facilities Management Committee, consisting of citizens selected from among applicants and experts, was established in 2010. The Committee repeated discussions for about two years, and formulated the Saitama City Public Facilities Management Plan in June 2012.

The plan aims to grasp the current situation of public facilities accurately, to forecast the future expenses for refurbishment and renewal, and to show the ideal state of development, refurbishment, renewal, management and operation of public facilities that can be handed down to the next generation without financial problems, while also realizing specific actions to be taken together with citizens by sharing the sense of crisis and problem awareness.

Because the mid- to long-term perspective is essential, the plan is based on the estimation for the next 40 years from FY2011 to FY2050. The period covered by the plan is 39 years from FY2012 to FY2050, which is divided into four terms to formulate specific action plans.

(Overall goal)

The Plan covers not only facilities (including schools, citizens' public halls, libraries, cultural facilities and welfare facilities), but also infrastructure (including roads, bridges, city-provided housing, waterworks and sewage systems). The overall goal (three principles) is set for each.

- Three principles for facilities

- ○ There will be no development of new facilities as a general rule (implemented within the scope of total volume control).
- ○ Renewal (reconstruction) of a facility should be a creation of complex facilities.
- ○ The total volume of facilities (total floor area) will be reduced (reduction by about 15% will be necessary in 40 years).

Complex facilities are regarded as an effective method to reduce the total volume of facilities. The management and operation are also unified, and the utilization or disposal of land that becomes vacant after creating complexes will be promoted.

About 18% of schools (29 out of 165 facilities) are currently converted into complex facilities. Most of them are creations of a complex with child welfare facilities (after-school children's club). The creation of complexes with local community-related facilities and welfare facilities for elderly and children nearby will be promoted upon refurbishment and renewal in the future.

- Three principles for infrastructure

- ○ The current investment amount (general account budget) level is maintained.
- ○ Life cycle cost is reduced.
- ○ New needs should be met efficiently.

As for the infrastructure of the city, also taking into consideration the fact that the development level is relatively low compared to other cities designated by government ordinance, it is decided to maintain a certain level of new establishment while reducing life cycle cost.

Formulation of an action plan

The action plan specifies the period from FY2014 to FY2020 as the first term, and sets forth the development standards and the time for refurbishment and renewal for each genre of facilities.

The idea of Saitama City's buildings maintenance policy is streamlined. The action plan will also be coordinated with the school facilities development policy of the board of education (School Facilities Refresh Plan).

Sharing of problem awareness with regional residents

In order to share the problem awareness on facilities possessed by the city with local residents and carry forward specific efforts through cooperation, the Saitama City Public Facilities Management Committee mentioned above will be implemented publicly. At the same time, information on the committee and on the White Paper on Public Facilities Management is disclosed widely to the public via a website. A comic edition pamphlet is also issued.

In addition, as for the creation of complexes with schools as a core, a workshop for local residents and citizens selected from among applicants is implemented for the discussion on the realization of easier-to-use complexes.

A pamphlet on the Public Facilities Management Plan made under cooperation with Manga-Dan, a student organization in Saitama University, and others

3: Achievements and problems

The White Paper on Public Facilities Management is updated every year to confirm the progress of plans for every fiscal year.

In addition, a Prior Consultation System where discussion is held with the department exclusively in charge with public facilities management at the stage of the renewal and development of each facility is introduced to increase the viability of the plans.

Further, since the understanding and cooperation of citizens are essential for public facilities management, PR with citizens will be carried forth in a multifaceted manner, such as holding briefing sessions and symposiums, and implementing participatory workshops.

Workshop using a school within the city as a model

4. Effective Use of School Facilities

Points of the Indications in the Vision for Countermeasures against the Deterioration of School Facilities

○ It is necessary to review the adequate size of school facilities by determining changes in the number of students in the future.
○ Upon doing so, it is possible to further promote the effective use of vacant space, such as spare classrooms, and at the same time consider the creation of complexes or the promotion of joint use with other public facilities, in the view that the school facility is the core of the region

Case Examples Shown

Introduced here are case examples where the creation of a complex with libraries and citizens' public halls is realized or spare classrooms are converted into elderly welfare facilities, from the perspective of the effective use of administrative assets, when refurbishing deteriorated school facilities.

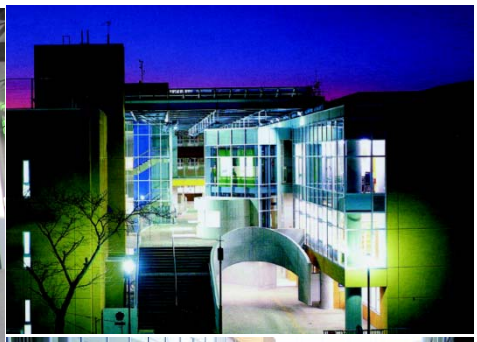
There are also case examples of efforts in the effective utilization of facilities through the conversion of spare classrooms and closed upper secondary schools into classes for special needs education or schools for special needs education, for which demand is increasing.

◆ **Diversification of functions according to the situation of the region**

4-1 Shiki City Shiki Elementary School (Saitama Prefecture)	Creation of a public facility complex utilizing existing school building
4-2 Muko City 4th Koyo Elementary School (Kyoto Prefecture)	Creation of a complex by converting spare classrooms into an elderly welfare facility

◆ **Utilization of spare classrooms**

4-3 Katori City Sawara Elementary School (Chiba Prefecture)	Conversion of spare classrooms into classes for special needs education
4-4 Tokyo Metropolitan Eifuku Gakuen (Tokyo)	Effective use of a closed upper secondary school



4-1

Creation of a public facility complex utilizing existing school building

Saitama Prefecture

Shiki City Shiki Elementary School

1: Background

The former Shiki Elementary School (constructed in 1954, 1965 and 1977), the former Shiki Citizens' Public Hall (constructed in 1965) and the former Shiki Library (constructed in 1967), which mainly had the problems of deterioration and earthquake resistance, were decided to be combined into a complex not only for the purpose of fusing together the school education and social education, but also from the perspective of the effective utilization of the city's land and school facilities.

The Committee on the Complex Facility of Shiki Elementary School, Social Education Facility, and Others was established, consisting of members selected from among applicants. The committee formulated the basic concept of school-community integration, and selected a design company through a proposal competition. Upon creating the complex, the reinforcement of earthquake resistance and large-scale refurbishment were applied to some of the school buildings, instead of reconstructing all the existing school buildings. The existing school buildings and reconstructed parts are covered under a single, combined plan.

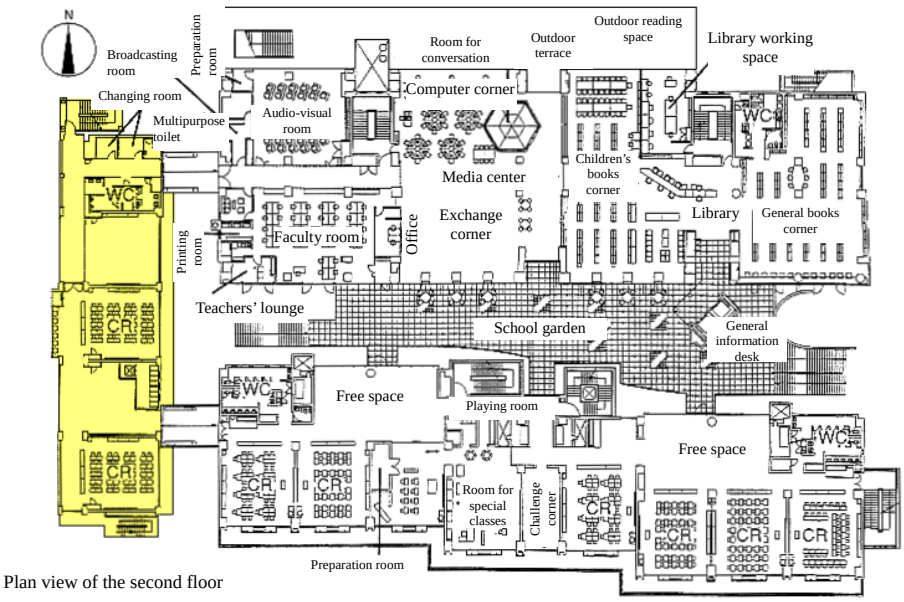
2: Details of the effort

Refurbishment of existing school buildings

As for the south school building, which is the existing building from the old school, braces were affixed at the window to reinforce earthquake resistance. Partition walls between the classrooms were also removed to make an open space, allowing the facility to adapt to various types of education.

When reinforcing earthquake resistance, one wall of the home economics classroom was removed and reinforced with a steel frame, so as to lessen the feeling of oppression in the opening as far as possible.

The existing building was fully renewed, almost to the same extent as the reconstructed parts, by setting air conditioning facilities, using wood materials for the interior, and refurbishing toilets.



Plan view of the second floor

Layout plan (part shown in yellow is the refurbished school building)

Reconstruction as a complex facility

The plan for the creation of a complex facility gave consideration to ensuring sufficient safety.

For example, a general information desk with a permanent residing guard is established at a place where all the users of the facility will go through. The faculty room is positioned next to the library, where many general users come and go. By making the place have good visibility, with the corridor separated by only a 1m-high counter, intrusion by suspicious individuals can easily be blocked.

3: Points of special attention

The plan paid attention to making the facility consistent with the purpose of the school-community integration, including planar measures such as open classrooms, and the exterior painting intended to give a feeling of unity by harmonizing the color tone with the newly constructed parts.

Further, in consideration of the effective use of facilities, special classrooms for the elementary school (music room, science room, test kitchen, home economics classroom, etc.) are open to citizens' use during nighttime, holidays and long-term vacations, when the students do not use them. It is also planned that libraries can be used by students even when it is closed.

4: Achievements and problems

Ten years have passed since the creation of the complex facility, but the refurbished parts are just as usable as the reconstructed parts.

Through direct exchange with the local community (citizens using the facility) it became possible to develop children's wisdom, knowledge and social skills, and to promote education where children can learn and think themselves.

Although safety management measures are taken in a fully appropriate manner, by installing security cameras and allocating personnel, efforts should be made to ensure further safety under the cooperation of relevant staff and many users.

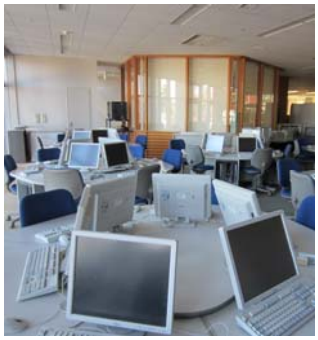
Open classroom that is adaptable to various types of classes

Home economics classroom, where the beams at parts where the partition is removed are supported by H-shaped reinforcing steel

Reconstructed parts

Faculty room, loosely dividing the library from the school (Taken from the corridor side)

Library and computer classes are spaces also used widely by the general public



Adjacent Yugakukan (cultural and educational facility) (chorus session being held)


Entrance to the elderly welfare facility


Japanese room


Entrance

4-2

Creation of a complex by converting spare classrooms into an elderly welfare facility

Kyoto Prefecture

Muko City 4th Koyo Elementary School

1: Background

Muko City was turned into residential areas from around the 1960s, and became one of most overcrowded areas in Kyoto Prefecture with the rapid inflow of residents from other regions. Although the steady aging of the population and the decline in the number of children is expected in the future, there is only one elderly welfare facility in the city, in the southern part, which is becoming too crowded with the increase in the number of users. Therefore, there have been requests from citizens to establish a new facility in the northern part of the city.

On the other hand, spare classrooms have been emerging in schools due to the decreasing number of students. From the perspective of efficient and effective operation of administrative assets, it was considered important to actively utilize spare classrooms for purposes such as lifelong learning and social welfare, according to the situation of the region.

2: Details of the effort

Earthquake resistance was reinforced for the 27-year-old (at the time of refurbishment) school building. At the same time, refurbishment for the conversion to an elderly welfare facility was implemented.

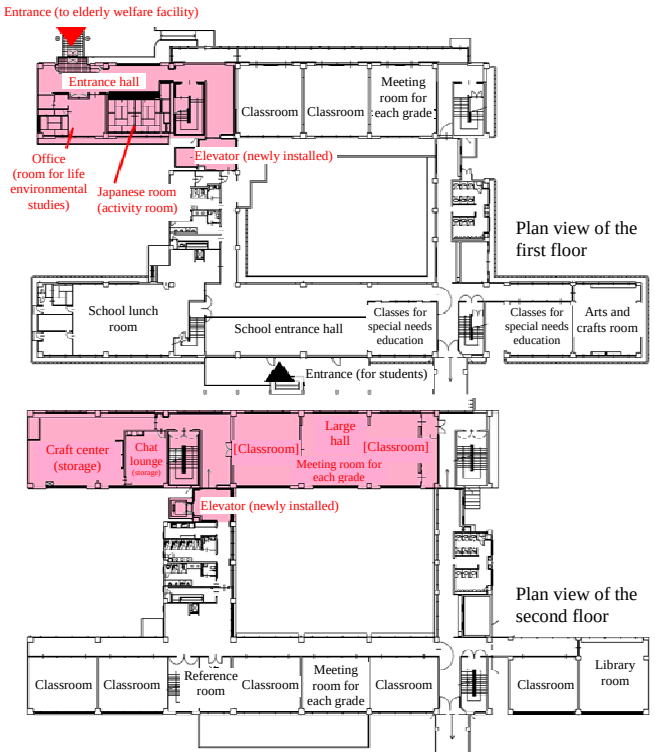
- ○ Spare classrooms that had been formerly used as a meeting room for each grade and storage were remodeled into the office, a craft center where pottery art and craftwork are done, and a multipurpose large hall for elderly welfare facility.
- ○ Exclusive entrance for the elderly welfare facility is newly established.
- ○ Elevator is newly installed and lifelines are renewed.
- ○ Other refurbishment of the school was implemented (new establishment of school lunch room, etc.)

Construction cost (construction area)

Elementary school: 168,612,000 yen (1,323m^2)
Elderly welfare facility: 162,557,000 yen (993m^2)

3: Points of special attention

As for the utilization of spare classrooms, it is important to make sufficient consideration so that there will be no shortage in school facilities and that the safety and educational environment of students are ensured. Discussions among the school, parents and local residents were repeatedly held to avoid any hindrance in providing school education.



Plan view after the refurbishment
(Parts in pink are the elderly welfare facility; use before conversion is shown in parentheses)

In addition, because mutual interference of the traffic lines of students and elderly was a concern, the traffic lines were separated so that each facility can be independently operated, and that exchange among different generations can be expected while limiting the scope of activities.

4: Achievements and problems

There are occasions set for the elderly to teach traditional games to students or have school lunch together. It is considered that being able to learn various kinds of real-world knowledge and about actual lifestyles from elderly people, with their abundant experience, knowledge and skills, contributes to the further promotion of the experience learning of students, which is being increasingly focused on recently.

More than ten years has passed since the refurbishment. It is the responsibility of the government to make the users continue to feel like the facility is still new, and to try to extend the life of the facility. It is considered that the promotion of the creation of similar complex facilities is effective under the severe fiscal condition.

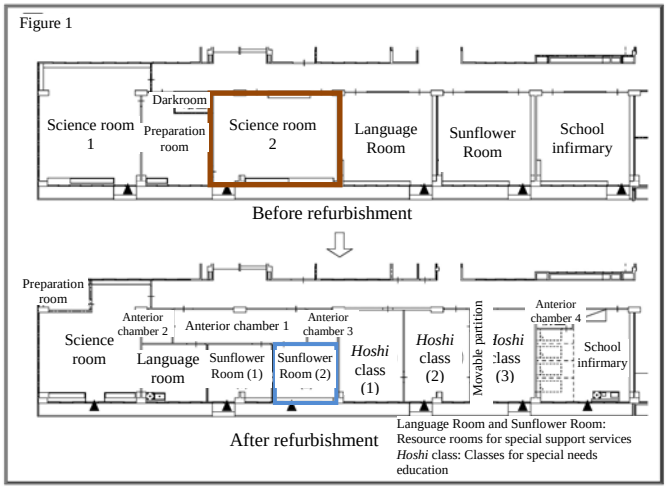
4-3

Conversion of spare classrooms into classes for special needs education

Chiba Prefecture

Katori City Sawara Elementary School

Before refurbishment (science room)



1: Background

Katori City Sawara Elementary School once held about 2,000 students, but the number of students decreased to about 950, and there were many spare classrooms.

Therefore, because one building on separate grounds across the city road was rather inconvenient for use, it was decided to use it for after-school students' club. In addition, because one of the two buildings where ordinary classes are held was notably deteriorated without a history of large-scale refurbishment, refurbishment as a countermeasure against deterioration was implemented, in addition to the reinforcement of earthquake resistance. In the process, classrooms less frequently used were converted into rooms for classes for special needs education and for other purposes.

2: Details of the effort

Conversion of spare classrooms

The conventional resource rooms for special support services were those converted from former classrooms without any refurbishment, so the size was too large in light of their actual use. Therefore, two science rooms located on the first floor, which had not been used frequently, were reduced to one, while one science room and science preparation room were refurbished into three resource rooms for special support services. Because students from other schools also come to these resource rooms, anterior chambers were established as waiting areas for parents.

One of the classes for special needs education used to be on the first floor, while the other two were in the separate school building. Thus, the former classrooms for special needs education and resource rooms for special support services were refurbished into three classrooms for special needs education. The partition separating two of these rooms is movable so that the rooms can be used flexibly according to the form and size of the class.

Review of the layout of classrooms

With the conversion of spare classrooms, the layout of classrooms, for which there had been no particular plans in the past, was reviewed. Special classrooms with less frequent use were converted to ordinary classrooms and resource rooms for special support services, and classroom layout was streamlined. As a result, all classes, including those that used to be in the separate school building, are now being held in the same school building.

3: Points of special attention

Upon the conversion of spare classrooms and the review of classroom layouts, the opinions of teachers and other personnel using the rooms were heard to ensure that they do not feel inconvenience or discomfort due to the increase in the number of classes. There were many opinions on facilities intensively used by students during breaks, such as that more water outlets were necessary or that the number of toilets should be increased, which were incorporated in the design.

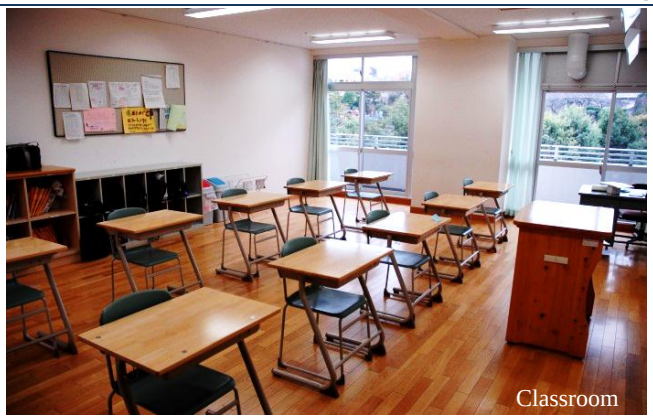
After refurbishment (resource rooms for special support services)

As for resource rooms for special support services, because the number of students using the service increased every year, the scale was extended so that the facility can cope with the future special support services using resource rooms, which are expected to increase further.

4: Achievements and problems

This refurbishment aimed to convert spare classrooms. Although there was concern that spare classrooms will be in shortage with the reduction of one school building, it was possible to consolidate classrooms by refurbishing science rooms into resource rooms for special support services.

However, because the sound insulation of resource rooms for special support services is not sufficient, the noise from adjacent rooms is somewhat distracting for the quiet environment of individualized teaching. Facilities should be planned by also considering the classroom environment distinctive to small-group education when developing classrooms for small-group education in large-scale refurbishment.


Classroom


Practice room resembling a cafe

4-4

Effective use of a closed upper secondary school

Tokyo

Tokyo Metropolitan Eifuku Gakuen

1: Background

Tokyo Boards of Education closed Tokyo Metropolitan Eifuku High School (hereinafter referred to as Eifuku High School) in March 2004, based on the Tokyo Metropolitan Upper Secondary Schools Reform Promotion Plan formulated in September 1997.

On the other hand, it was decided to establish Tokyo Metropolitan Eifuku Gakuen as a school for special needs education also having a new upper secondary specialized vocational course (vocational skills course) aiming to achieve the employment of all students with minor intellectual disabilities and a sector for the education of orthopedically-impaired students.

The establishment of Eifuku Gakuen was decided to be based on the utilization of the school buildings of the former Eifuku High School.

2: Details of the effort

Refurbishment including the enhancement of earthquake resistance was implemented on school buildings of the former Eifuku High School, and classrooms and faculty rooms for the vocational course were developed. The advantages of the existing school building were fully utilized, such as the entrance space of the former Eifuku High School being refurbished into the school infirmary with abundant light and space, and the audio-visual room in tiers retained as a space for meetings of all 100 students.

Vocational practice rooms for use in the vocational course was set in the venue, such as in the schoolyard of the former Eifuku High School, while the extension work to establish facilities for the education of orthopedically-impaired students was also implemented.

Classrooms

Classrooms for the vocational course were refurbished by dividing the former two classrooms for 40 students (about 8.7m × 7.8m each) into three classrooms, considering the required space for 10 students, which is the capacity per class, and necessity to secure classrooms for 30 classes in total for three grades.

Practice rooms assuming the actual working site

The vocational education course was established by assuming the actual places of students' employment in the future, so that the graduates of the vocational course are expected to be ready to start working immediately. The vocational practice rooms were refurbished into kitchens and cafes by utilizing the former water drainage system of the special classrooms of the former Eifuku High School.


Faculty room


Before refurbishment
(former cooking room)

Construction cost: 3,939,745,000 yen
(Refurbished area: 8,424 m^2, extended area: 7,781 m^2)

3: Points of special attention

In order to use the school building of the former Eifuku High School as a school for special needs education, air conditioning devices were installed in all classrooms, and construction work to ensure barrier-free access, such as the elimination of floor unevenness, was implemented.

4: Achievements and problems

It was possible to reduce expenses for demolishing the school building and constructing building frames by refurbishing the existing facilities.

However, after five years from the refurbishment, underground water pipes that were not refurbished are deteriorating, so countermeasures should be taken.

5 Reduction of Cost with an Ingenious Refurbishment Method

Points of the Indications in the Vision for Countermeasures against the Deterioration of School Facilities

○ Under the severe fiscal condition, it is necessary to sufficiently consider efficiency when implementing countermeasures against the deterioration of school facilities.

○ If the conversion of vacant space, such as spare classrooms, cannot be expected, the possibility of downsizing school building premises should be considered, because solely retaining a facility carries a cost in terms of maintenance and repair.

Case Examples Shown

Introduced here are case examples where expenses related to ensuring temporary school buildings during refurbishment work are reduced.

There are also case examples where expenses for enhancing earthquake resistance and for maintenance and management are reduced by downsizing school building premises for spare classrooms with no plans for use in the future.

In addition, there are case examples of implementing major refurbishment while utilizing the technical and other capabilities of the private sector.

◆ **Reduction of expenses on ensuring temporary school buildings during the construction**

5-1 Tonami City (Toyama Prefecture)	Utilization of piloti and gymnasium
5-2 Gokase Town (Miyazaki Prefecture)	Implementation of joint classes with neighboring schools
5-3 Koto-ku (Tokyo)	Reduction of expenses by utilizing closed schools

◆ **Downsizing school building premises**

5-4 Otsu City Zeze Elementary School (Shiga Prefecture)	Downsizing school building premises by demolishing the second floor
5-5 Arita City Hatsushima Elementary School (Wakayama Prefecture)	Downsizing school building premises for wings with lower frequency of use

◆ **Implementation of** Publicly-Invited Proposals

5-6 Kitanagoya City Nishiharu Junior High School (Aichi Prefecture)	Collaboration with a creative designer with high technical capability

5-1

Utilization of piloti and gymnasium

Toyama Prefecture

Tonami City

1: Background

Although expenses for constructing temporary school buildings when implementing refurbishment work is covered by national subsidies, it is necessary to hold down costs such as the expenses for establishing temporary school buildings in order to efficiently promote the enhancement of earthquake resistance. Therefore, efforts are made to eliminate the need for temporary school buildings, through an ingenious construction plan, other than the cases where temporary buildings are absolutely necessary.

2: Details of the effort

Utilization of piloti under the gymnasium

In Tonami City, there are schools with piloti under the gymnasium to provide an outdoor space for exercise in rainy or snowy weather. Outer walls and partitions were built in the piloti of gymnasium for use as a temporary school building.

School name	Period	Major use	Expenses	Reference
Demachi Junior High School	Two years from FY2012	- Ordinary classrooms - Special classrooms	Approx. 40 million yen (Approx. 1,100 m^2)	Figure 1
Tonami Tobu Elementary School	One and a half years from FY2005	- Entrance for students - Faculty room	Approx. 14 million yen (Approx. 1,000 m^2)	Figure 2

Utilization of gymnasium

In Shogawa Junior High School, the gymnasium was divided with partitions to be used as classrooms. Physical education during the period was implemented by utilizing the neighboring social physical education facility.

School name	Period	Major use	Expenses	Reference
Shogawa Junior High School	About eight months in FY2008	- Ordinary classrooms	Approx. 12 million yen (Approx. 500 m^2)	Figure 3

3: Points of special attention

Because ventilation is usually insufficient, fans were installed as a preparation against summer heat. Rooms not facing outside are used as storerooms rather than as classrooms.

When using the gymnasium as a temporary classroom, the floor was covered with plywood to avoid damaging it. Also, the ceiling was framed only in cases where used as a classroom during winter, to protect from cold.

4: Achievements and problems

In cases where piloti under the gymnasium are used, foundation construction, structure construction such as beams, and construction for roofs become unnecessary. When gymnasiums are used, construction of the floor also becomes unnecessary in addition to the above. Therefore, construction cost for temporary school buildings was reduced by 20% to 50%. In addition, it was unnecessary to secure a site for temporary school buildings, and the construction period could also be shortened according to the reduction of the amount of construction work.

There are also issues to be addressed. There were opinions that noise from other classrooms was distracting in the case where the ceiling was unframed. It is also necessary to take case-by-case countermeasures against heat in summer and cold in cold-weather regions.

Figure 1: Piloti used as classrooms

Figure 2: Piloti used as entrance for students

Figure 3: Gymnasium used as classrooms

5-2

Implementation of joint classes with neighboring schools

Miyazaki Prefecture

Gokase Town

1: Background

In Gokase Town, the advantages of small-sized schools such as the availability of small-group guidance and the smaller number of students per teacher are fully utilized, while joint learning among four schools is implemented on a daily basis so that the best appropriate classes can be implemented for each learning issue. On the other hand, each elementary school is the disaster prevention base of the region, and the base for community activities. The town utilizes the mobility distinctive to small-scale schools, and is promoting the development of human resources that can contribute in Gokase, through hometown learning and experimental activities.

Construction work was carried out to enhance earthquake resistance (including refurbishment against deterioration) for Kuraoka Elementary School and Sangasho Elementary School in FY2009. Although it was necessary to construct a temporary school building for the implementation of work to reinforce braces and apply wood materials for the interior, because joint learning among four schools is implemented on a daily basis in the town, joint classes for two schools were held in two schools without the need for construction work during the second term, when the construction work was implemented, to reduce the expenses for constructing temporal school buildings and to shorten the construction period.

2: Details of the effort

Implementation of joint classes

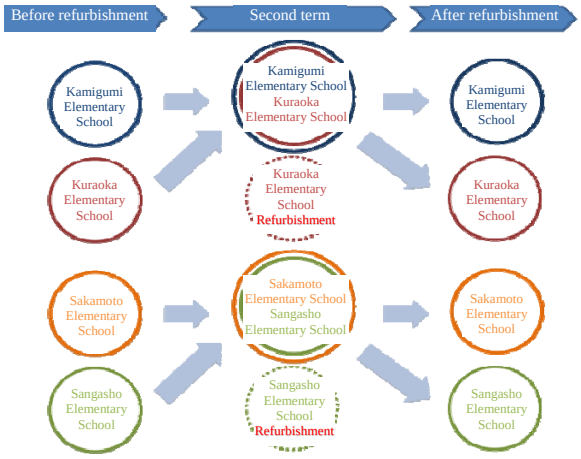
There was no need to add new classrooms or implement interior refurbishment. Two class teachers from each of two schools were at one classroom, and there were also improvements in how to carry forth the classes such as team-teaching and small-group guidance.

School zones and commuting to and from schools

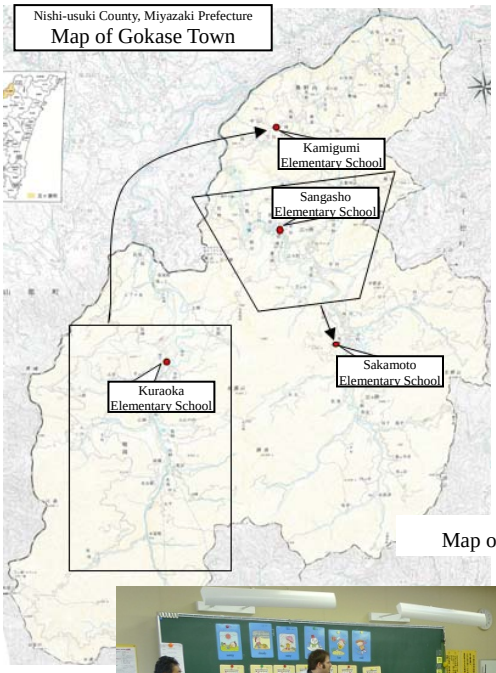
Students of Kuraoka Elementary School (53 students) commuted to Kamigumi Elementary School (54 students), while students of Sangasho Elementary School (106 students) commuted to Sakamoto Elementary School (43 students) using chartered buses. It took about 20 minutes from Kuraoka to Kamigumi (about 40 minutes from the most remote settlement to Kamigumi Elementary School), and about ten minutes from Sangasho to Sakamoto (about 20 minutes from the most remote settlement to Sakamoto). The time was shortened compared to the ordinary commuting on foot, and it also contributed to ensuring traffic safety.

Ensuring safety during construction period

Because there would be no students and people in the school building during the construction, there was no need to ensure students' safety related to construction traffic and bringing in construction materials, or to take measures against noise. Therefore, it was possible to implement the construction smoothly, which also resulted in the shortening of the construction period.



Schematic view



Map of Gokase Town

Class led by two class teachers at the same time

3: Points of special attention

Although joint classes were held on a daily basis, there was a concern that children may feel anxious about forming relationships while spending a long time with the students of another school. Therefore, two class teachers frequently exchanged information and sufficient time was secured for orientation.

4: Achievements and problems

A sense of solidarity was generated to the extent that students made a request to hold a commencement ceremony together. Most opinions from parents were also positive comments.

It is important to discuss sufficiently among schools and to confirm in advance the work procedure for bringing supplies in and out in a short period.

5-3

Reduction of expenses by utilizing closed schools

Tokyo

Koto-ku

1: Background

In Koto-ku, if a temporary prefab school building is installed in a schoolyard when implementing refurbishment and reconstruction, the schoolyard becomes almost unusable, and may cause problems in implementing physical education classes. On the other hand, functions for school are all available in the temporary school building, and without the noise during the construction period, it is effective to ensure the learning environment.

Therefore, elementary schools closed due to reduction in the number of students have been used as temporary school buildings from FY2001.

2: Details of the effort

In order to cope with the refurbishment and reconstruction of schools in regions far away from the temporary school building, the operation of a school bus was decided on, based on the strict observance of commuting time and the necessity of securing safety.

In addition, because the functional and operational effectiveness of the temporary school building was confirmed through actually using it, construction work to enhance earthquake resistance and large-scale refurbishment were implemented after FY2008 to improve safety and facility, and to provide a comfortable educational environment.

Expenses for the development of the temporary school building

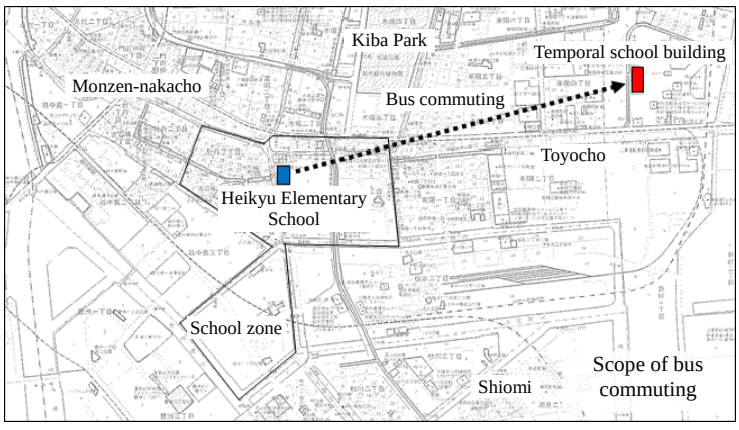
Construction work to enhance earthquake resistance (FY2008) and large-scale refurbishment (FY2010) Approx. 700 million yen (expenses born solely by the city)

Expenses for moving

Although it depends on the volume, distance and timing, 3 million yen was calculated for each way.

3: Points of special attention

Close discussion with the school was necessary for operating the school bus. Consideration was made for the operation plan and ensuring safety at the time of going to and from the school, ensuring safety inside the bus, and the development of a communication system during the operation.



Commuting on a school bus

In addition, it is necessary to move all furniture and fixtures of the school to the temporary school building in order to operate school there, and there is a need to thoroughly dispose of unnecessary goods and reduce the volume of things to be moved. The first step towards the smooth operation in the temporary school building will be to start the reduction work from the fiscal year before the refurbishment work starts, and to shift to a system allowing a smooth move.

4: Achievements and problems

For example, for the refurbishment of a 4,000 m^2 school building holding 12 classes, for 400 students for the period of seven months (150 days), lease expenses of about 300 million yen will be necessary for the installation, demolition and restoration of a temporary prefab school building. In addition, the schoolyard cannot be used for 13 months in total.

Considering long-term use, the operation of the school bus to the temporary school building will be advantageous in terms of the reduction of expenses, which also allows more efficient refurbishment and reconstruction. Further, in terms of the educational environment during the construction period, there is an immense advantage over a temporary prefab school building. Therefore, Koto-ku will continue using the temporary school building.

However, there are also cautious opinions about going to school outside the normal school zone using the school bus. Careful explanation should be given about the burden on each household and the impact on regional activities to win the understanding of the school, parents and local community.

Expenses for outsourcing bus operation and staff as traffic guides and attendants

School	Type	Fiscal year	Contracted amount (thousand yen)	Period
Fukagawa No. 8 Junior High School (reconstruction)	Bus chartering	2003	27,649	22 months
		2004	26,637	
	Attendant outsourcing	2003	2,042	
		2004	1,537	
Sunamachi No. 2 Junior High School	Bus chartering	2005	21,630	8 months
	Attendant outsourcing		1,402	
Fukagawa No. 3 Junior High School (reconstruction)	Bus chartering	2006	83,265	23 months
		2007	78,372	
	Attendant outsourcing	2006	2,959	
		2007	2,803	
Fukagawa No. 6 Junior High School	Bus chartering	2011	5,630	5 months
Heiku Elementary School	Bus chartering	2012	83,160	8 months
	Attendant outsourcing		7,383	

* Budgetary amount for 2012

5-4

Downsizing school building premises by demolishing the second floor

Shiga Prefecture

Otsu City Zeze Elementary School

1: Background

The number of students in Zeze Elementary School exceeded 1,800 at its peak, but is currently about 700, and there had been many vacant classrooms. It was also estimated that the number of students will be generally unchanged in the future and a significant increase cannot be expected.

2: Details of the effort

The second floor of the two-story school building was demolished and removed when implementing construction work to enhance earthquake resistance. Because there were private houses nearby, demolishing by the wire-sawing method, which generates less dust and noise, was used. In addition, the moving of solar power panels installed on the rooftop before the refurbishment, rooftop waterproofing, and the construction of removing the stairs and converting the space into a multipurpose space were implemented.

3: Achievements and problems

The weight on the building framework was reduced by making the building one-story high, resulting in improved earthquake resistance and fewer parts necessary for enhancement. The reduction of the maintenance cost of the building and expenses for demolition in the future will be expected.

Because a vast amount of water was used for demolishing the building, water leak damage was caused downstairs. It is necessary to select a dry method using foam materials, in addition to take sufficient waterproofing measures.

5-5

Downsizing school building premises for wings with lower frequency of use

Wakayama Prefecture

Arita City Hatsushima Elementary School

1: Background

The population of the school zone of Hatsushima Elementary School decreased about 30% over the last 20 years, and the number of students also decreased to half in ten years. In addition, the Is Figure, a seismic index of structure, was diagnosed as less than 0.3 for some parts of the school building. Use of the parts was prohibited as an emergency measure, but it was possible to secure a number of classrooms. Because an increase in the number of students cannot be expected in the future, it was decided to downsize the facility through the downsizing of school building premises when implementing the enhancement of earthquake resistance and large-scale refurbishment.

2: Details of the effort

One school building among the three was demolished. Because the reduction of the number of spare classrooms and the enhancement of earthquake resistance generated some space for which sufficient opening for use as classrooms cannot be secured, the layout plan was dramatically reconsidered. By holding a close discussion with teachers and other personnel, it was intended to make a layout plan according to the situation of the recent educational form.

3: Achievements and problems

Through the downsizing school building premises that originally required earthquake resistance enhancement, expenses for the enhancement of earthquake resistance and for exterior refurbishment became unnecessary. It is also expected that the maintenance expenses including light, fuel and water expenses and repair expenses will be reduced from the long-term perspective.

Also, in addition to downsizing school building premises and enhancing of earthquake resistance, the interior refurbishment and changes in the layout of classrooms resulted not only in the improvement of the learning environment but also in the realization of a classroom layout in line with the situation of the recent form of education.

5-6

Collaboration with a creative designer with high technical capability

Aichi Prefecture

Kitanagoya City Nishiharu Junior High School

1: Background

Before the refurbishment, the school was typical of the Showa Era, with north and south school buildings connected by a corridor. There was also an overwhelming number of complaints from students about the heat in summer, cold in winter, the dark and small spaces, and the lack of comfortable spaces, showing that the school did not provide a sufficiently favorable environment.

In order to absorb the ideas of the need for eco-schools and of the establishment of a relationship between the community and the school, as well as ideas for refurbishment into architecture design, a creative designer with high technical capability was selected by Publicly-Invited Proposal Procedures.

2: Details of the effort

Implementing Publicly-Invited Proposals

Proposals were publicly invited because it was judged that strong motivation could be expected of each participating designer and that it would be possible to accurately examine the creativity, skill, and experience of the designers. The examination was divided into two stages, namely the first documentary examination and the second hearing from designers. After the strict examination by twelve reviewing board members and 20 observers, the designer was determined.

In the process, proposals on the broad array of design details were invited, based on the details that had been considered from FY2005. Also in the design process, a workshop for the teachers and other school personnel was held twice, and a workshop for citizens was held three times, to find out what problems the school faced at that time and to incorporate the results of discussion into the refurbishment plan.

Improvement of educational environment

The plan included the expansion of the environmental learning center, and the realignment of the library room, computer room, and multipurpose room on the first floor to formulate a school media center which can also be opened to the local community. Four classrooms and one multipurpose space are gathered as a single unit after the refurbishment, used by each grade. Also by introducing fully-open-type fittings and securing multipurpose spaces, the refurbishment intended to create a variable space that can respond to the wide variety of learning forms, including team teaching and small-group learning, and all kinds of learning group units, as well as compatible with the future expansion of the facility.


Before refurbishment

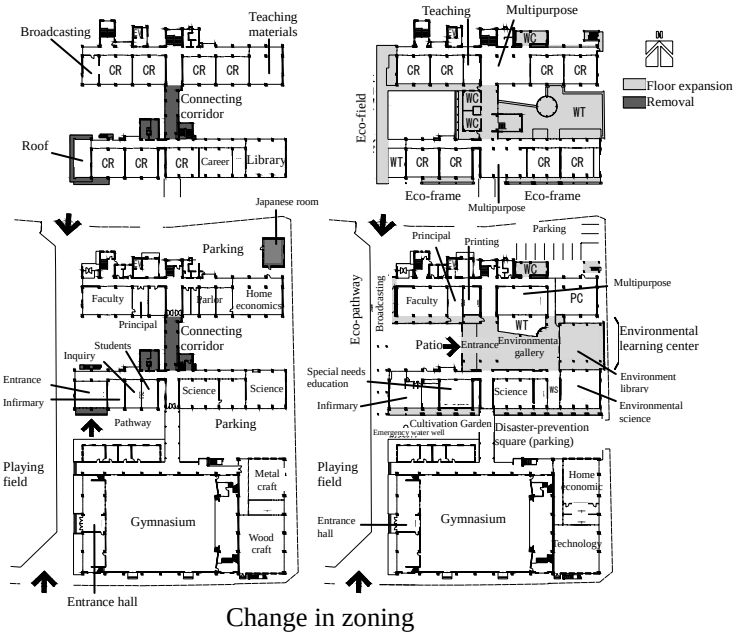

After refurbishment

Improvement of thermal environment

The installation of a mobile light shelf allowed the indirect taking in of diffused light and contributed to increasing homogenity, while the prevailing wind direction was closely studied to make draft ventilation and night purge available with the natural ventilation window installed in a wind tower.

In addition, a space for experimental learning was also provided, where students can study mechanisms by actually feeling the warmth of solar heat and the comfort of wind, through measures such as the greening of the roof and wall, the installation of a double roof on the existing school building, the use of rainwater, the sprinkling of water on the roof, and the use of solar heat.

Enhancement of earthquake resistance, the improvement of the thermal environment and learning space, and partial expansion supplementing the lack of functions were implemented simultaneously, to make a full refurbishment for creating a school that can be used for a long time while utilizing the existing school building. The construction cost about half as much as a new construction of a school building of equivalent size, and CO_2 emissions were 77 % less than they would be in the case of a new construction.



Change in zoning

3: Points of special attention

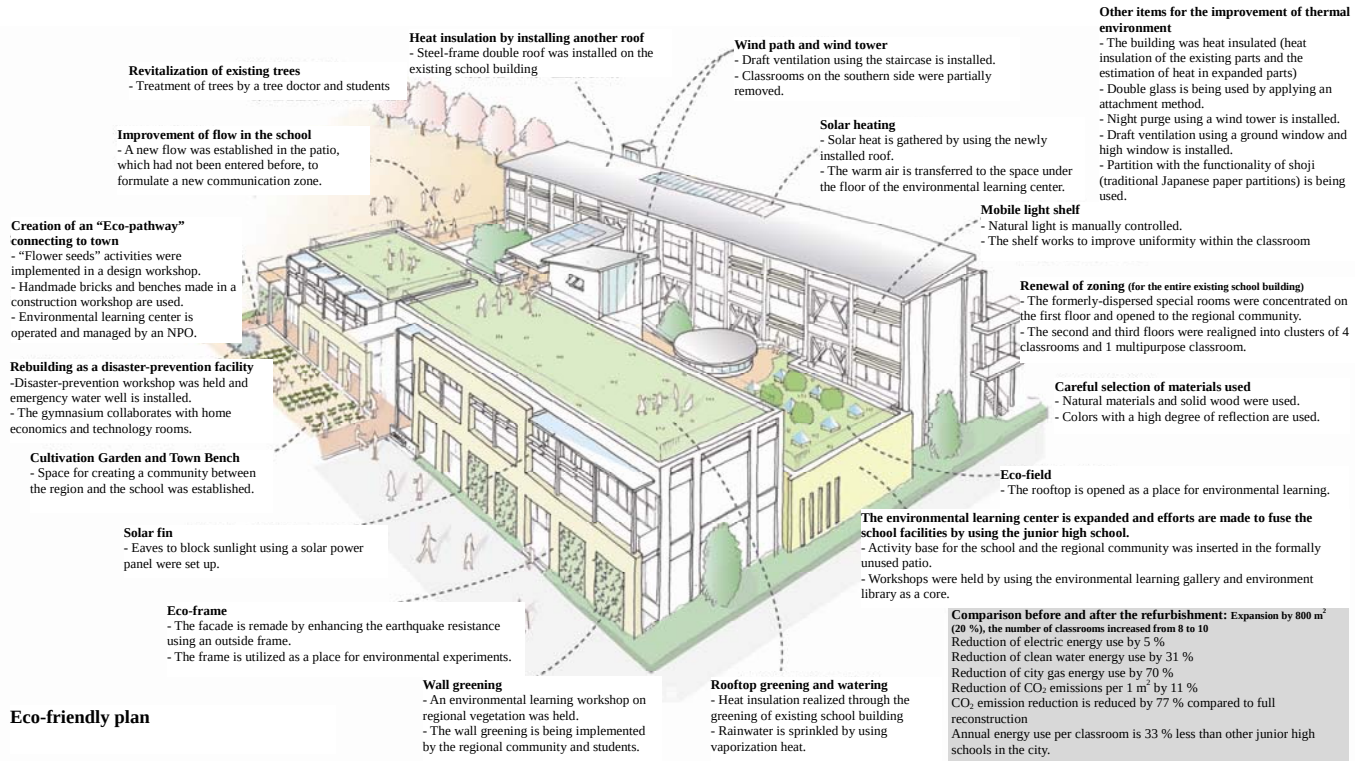
Consideration was made in selecting the designer so that teachers, relevant school personnel, and local residents could be asked to participate in the design process as much as possible.

Ensuring the fair composition of examiners, to avoid certain designers having an advantage over others, was also kept in mind.

4: Achievements and problems

It was difficult to set items to focus on in the proposal, scoring criteria and conditions for selecting the designer, as well as to adjust the schedule within the limited period and to coordinate the personnel organization. However, users' participation in the design process contributed not only to tangible results but also intangible achievements. For example, the Environmental Club was newly established and started activities at the school, and ongoing effort is being made in sharing the facilities and reference materials with local residents by opening the school on holidays. The ties between the community and the school were further strengthened.


Roof greening of the existing school building



Eco-friendly plan

Reference Data and Materials

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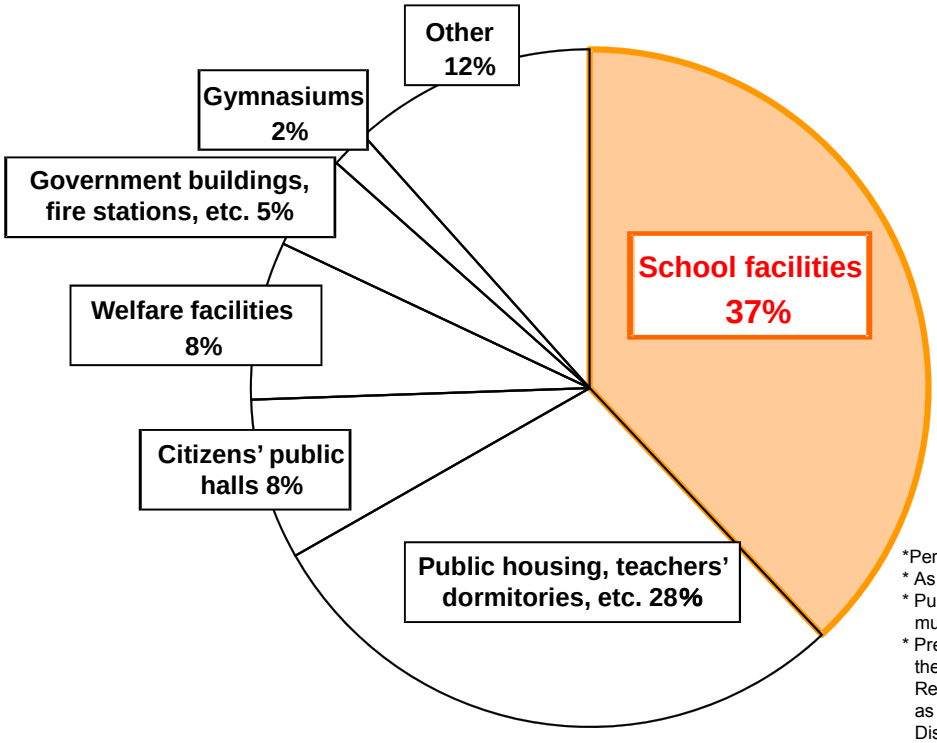
Reference Data and Materials

Percentage of School Facilities among All Public Facilities

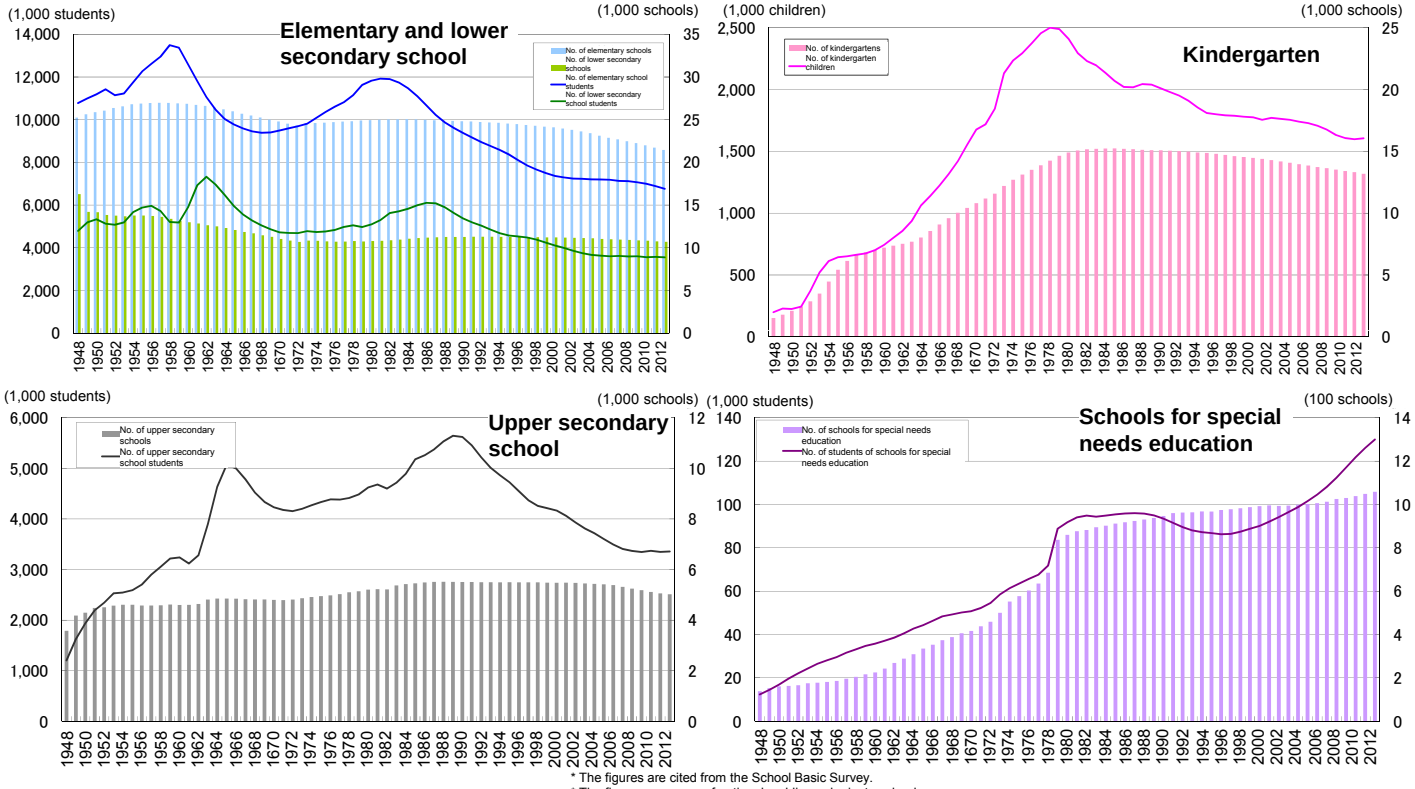
School facilities account for about 40% of the entire public facilities owned or managed by municipalities.



*Percentage of the number of buildings
* As of the end of FY2010
* Public facilities owned or managed by municipalities
* Prepared based on the Report on the Study of the Progress of Enhancing the Earthquake Resistance of Public Facilities, etc. that Serve as Disaster Prevention Bases (Fire and Disaster Management Agency, December 2011)

Changes in the Number of Schools and Children

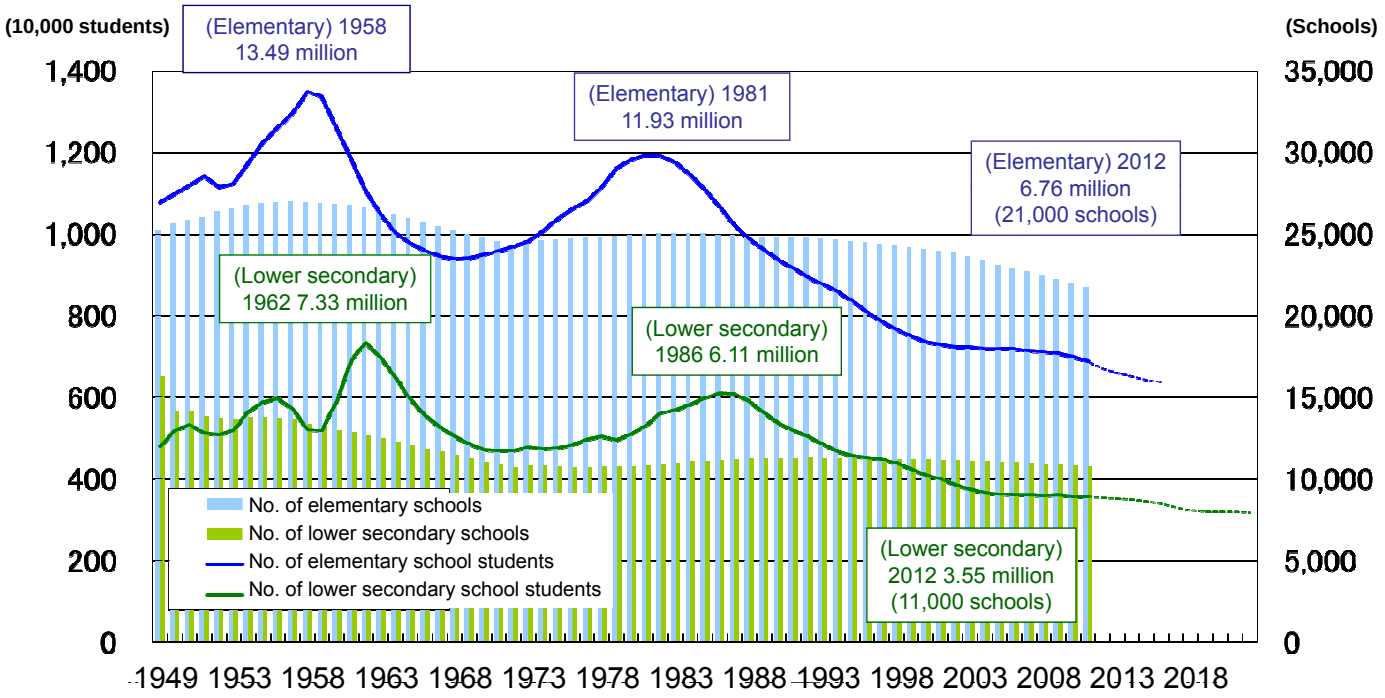
While the number of children and students of kindergartens, and elementary and secondary schools is declining, the number of students in schools for special needs education is on an increasing trend



* The figures are cited from the School Basic Survey.
* The figures are sums of national, public, and private schools.
* The figures do not include secondary education schools.
* The figures for schools for special needs education are those for schools for the blind, the deaf, and the otherwise disabled until FY2006.

Changes in the Number of Elementary and Lower Secondary Schools and the Number of Students

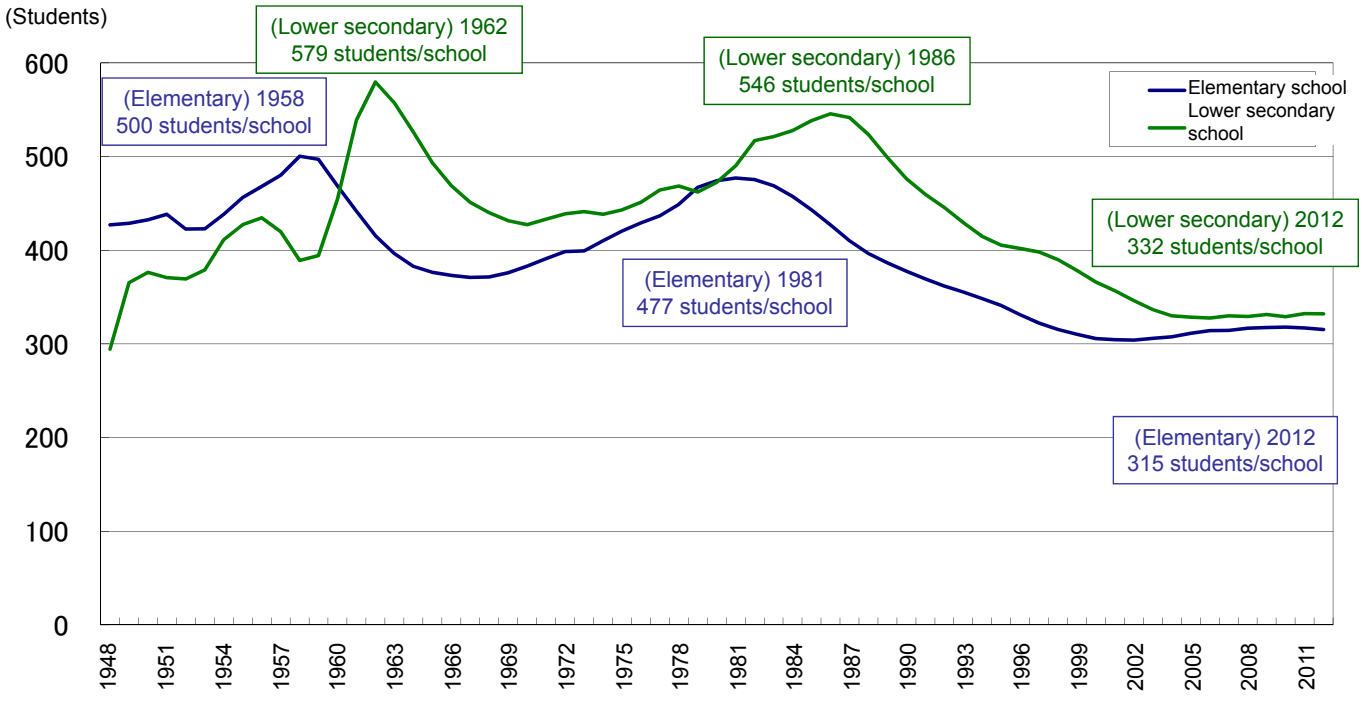
Increasing trend of the number of elementary and lower secondary school students turned to a decline after the period when the 2nd baby-boomers were students (around the late 1970s until the late1980s).



* The figures are cited from the School Basic Survey.
* The figures are the totals for national, public, and private schools.
* The first term of secondary education schools is not included in lower secondary schools.
* Figures after 2012 are based on the Census.

Changes in the Number of Students per School

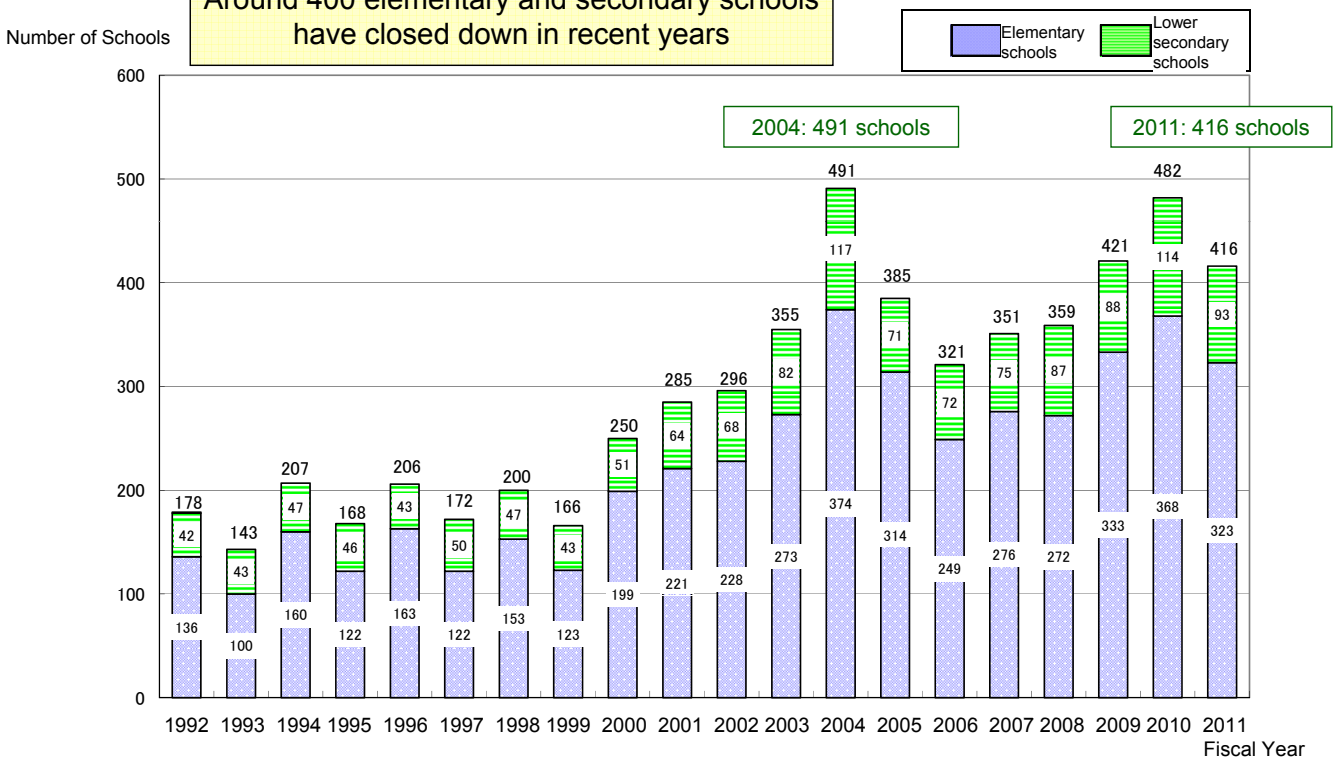
The number of students per school was over 500 students at peak time, but it is around 300 students in recent years.



*The figures are calculated based on the School Basic Survey
*The first term of secondary education schools is not included for lower secondary schools.

Number of Public Elementary and Lower Secondary Schools Closed Down in Each Fiscal Year

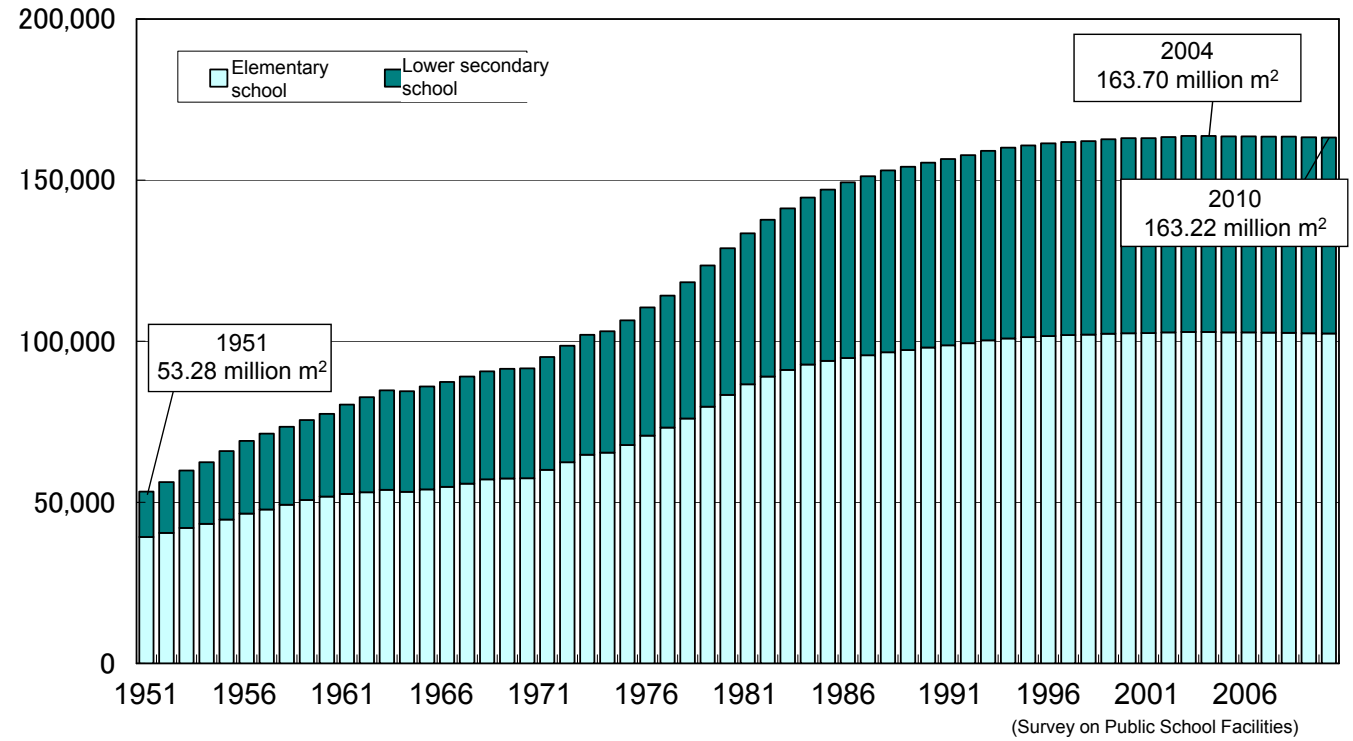
Around 400 elementary and secondary schools have closed down in recent years



*Survey on Utilization of Closed Schools, etc.
*The figures indicate the number of schools closed down pursuant to a municipal utility ordinance

Changes in the Retention Area of Public Elementary and Lower Secondary School Facilities

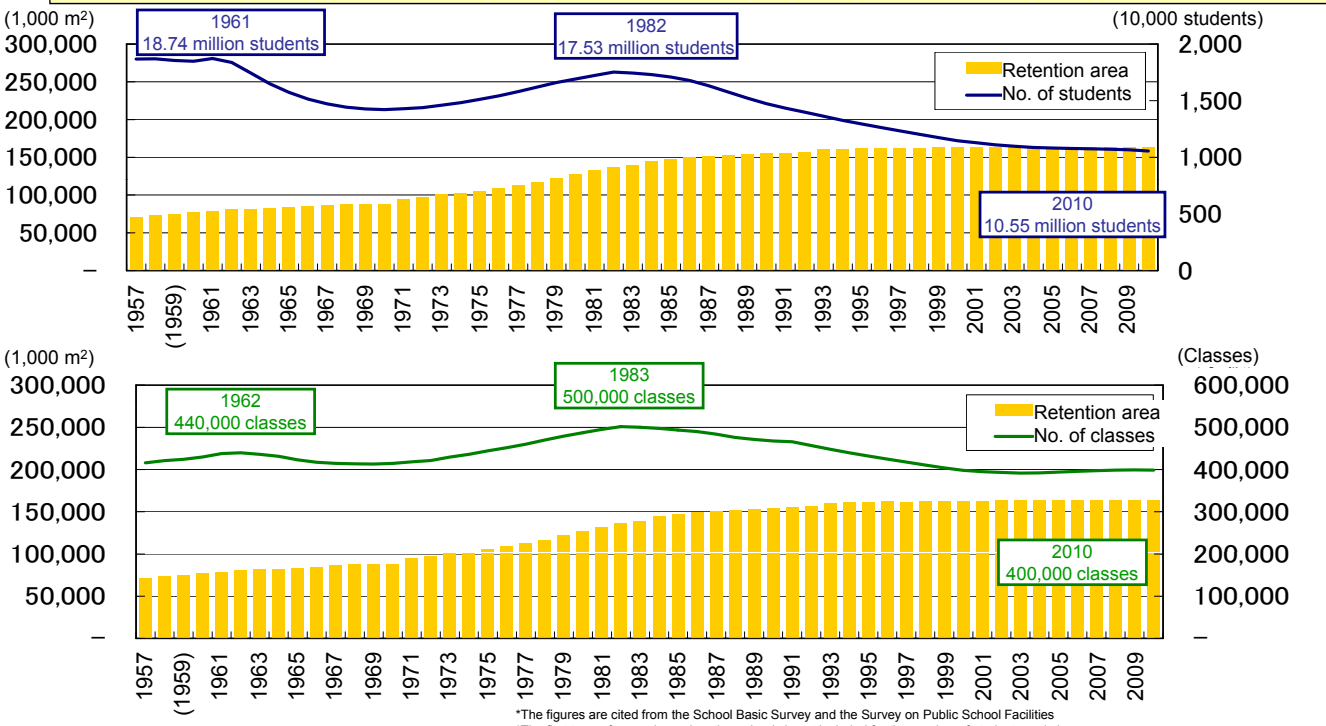
The area owned by schools increased along with the increase in the number of students since the war; however, it remains unchanged or has slightly declined in recent years.



(Survey on Public School Facilities)

Changes in the Retention Area and the Number of Students and Classes of Elementary and Lower Secondary Schools

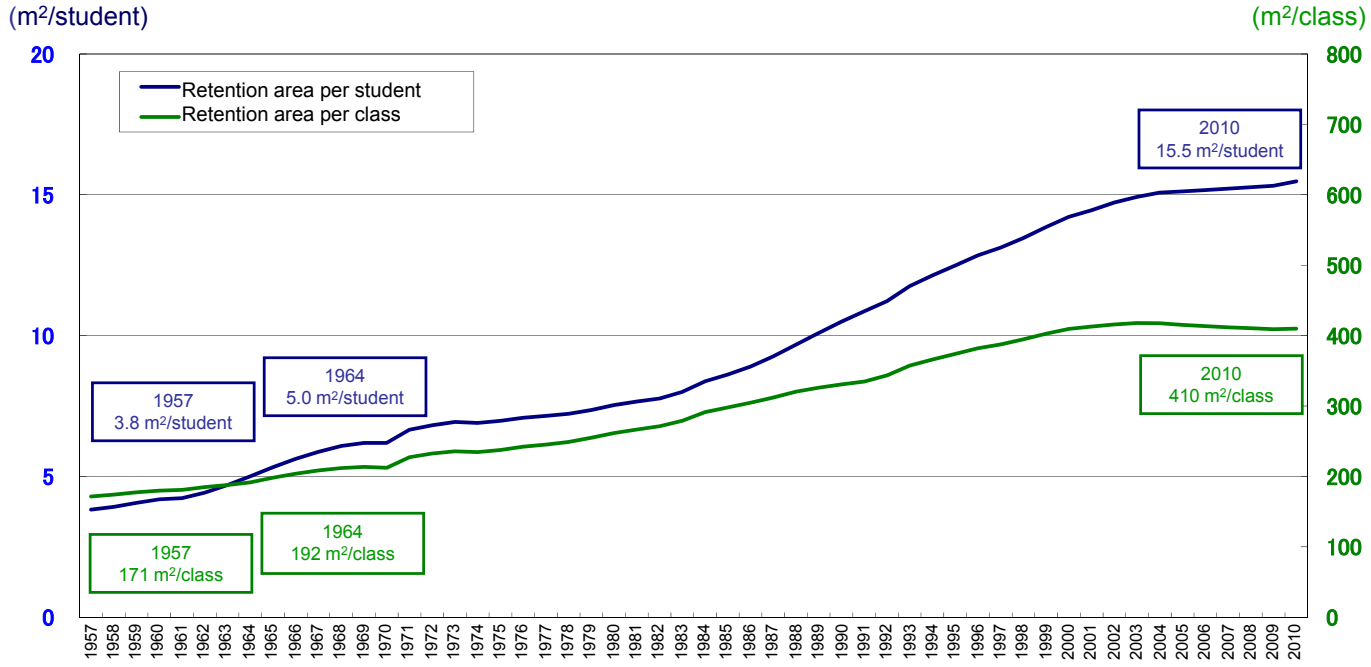
While the retention area increased after the war, it remains unchanged or has slightly declined in recent years
The number of students/classes has been declining since around the late 1970s - late1980s



*The figures are cited from the School Basic Survey and the Survey on Public School Facilities
*The first term of secondary education schools is not included for the number of students and classes.
*Some areas of "steel-frame and other buildings" and "wooden buildings" are converted to an area equivalent to reinforced concrete buildings
*The figure for the fiscal year in the bracket is the average of the years before and after.
*The figures before fiscal year 1992 do not include Okinawa Prefecture.
*The figures before fiscal year 1968 do not include dormitories.

Changes in the Retention Area per Student/Class

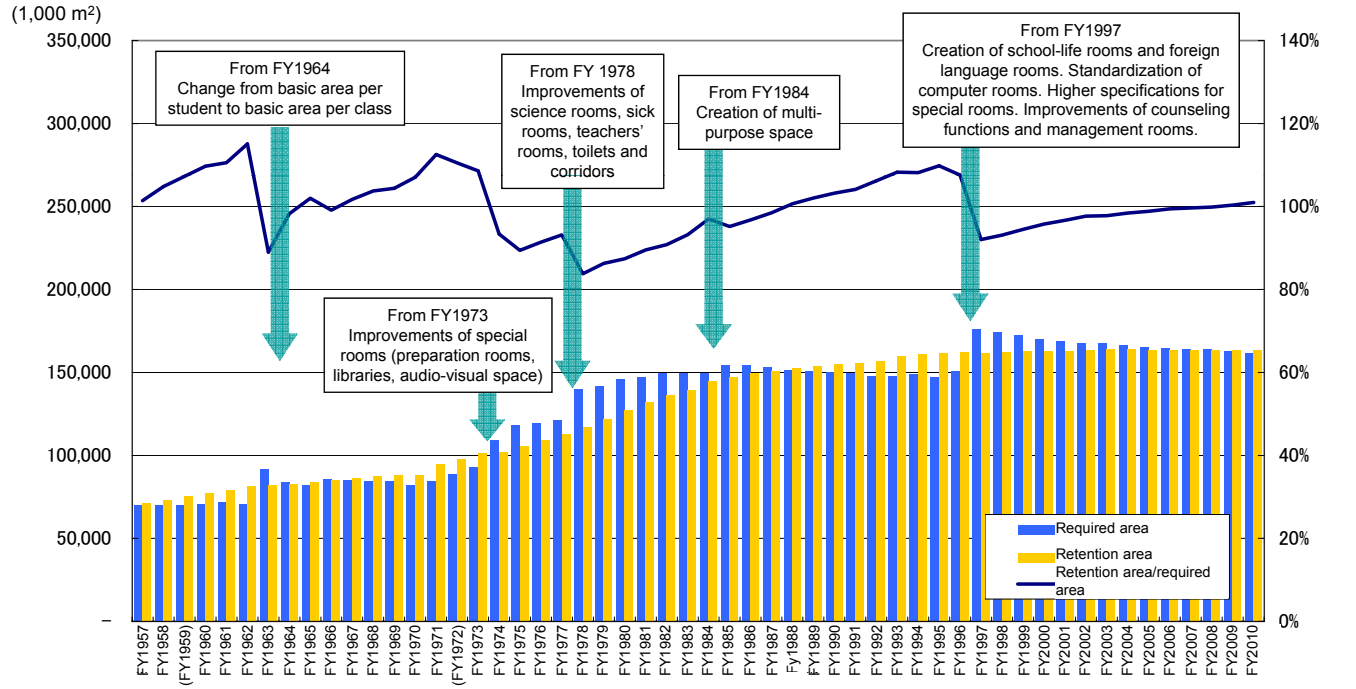
Compared with the first half of the 1960s, the area of retention per student nearly tripled, but the area per class increased nearly two-fold.



*Calculated based on the School Basic Survey and the Survey on Public School Facilities
*The fist term of secondary education schools is not included for the number of students/classes.
*The figures in the brackets are averages of the years before and after.

Changes in the Retention Area/Required Area of Elementary and Lower Secondary Schools

Required area has been revised several times as school facilities became more highly and multi functional.
The percentage of retention area to required area has been around 100%



[Reference] Percentage of retention area to required area (by school type/ by building category)

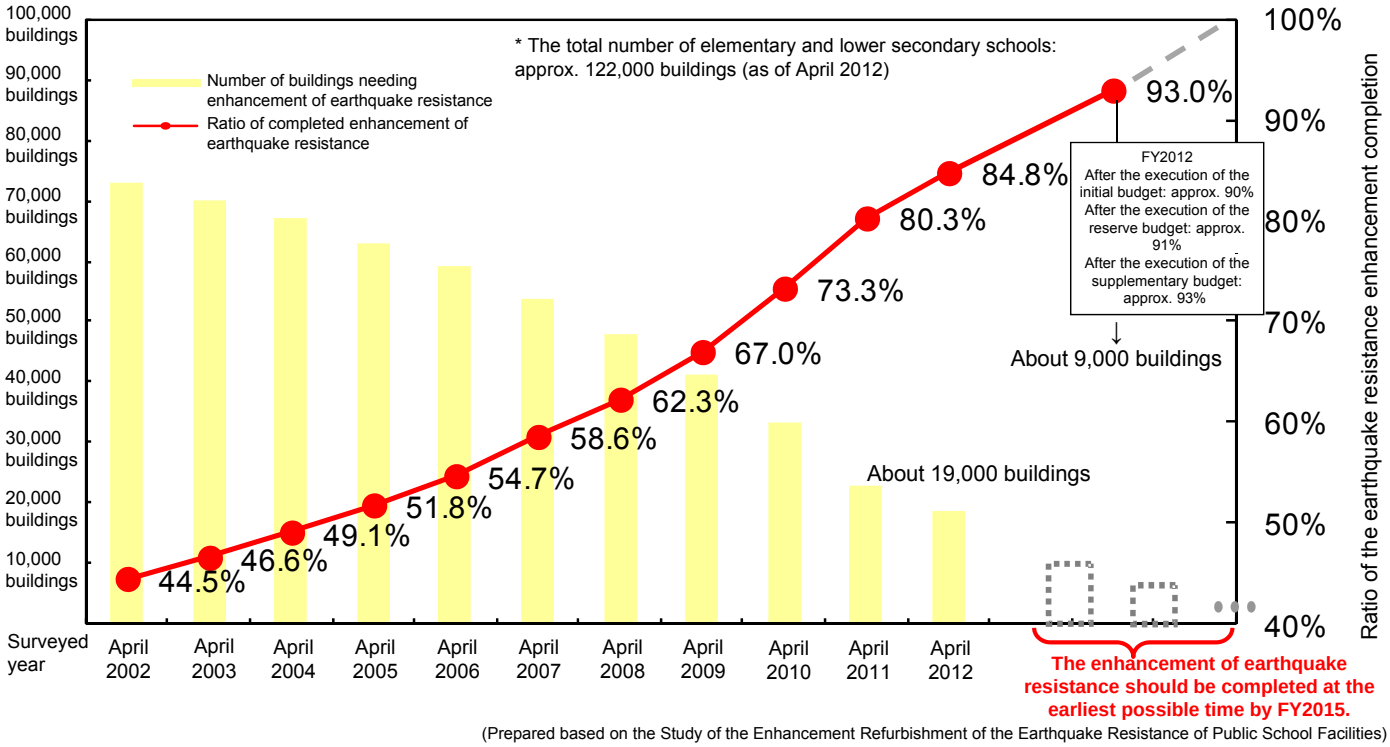
	Elementary school	Lower secondary school
School building	102%	110%
Stage	81%	95%

(As of May 1, 2010)

*The figures are cited from the Survey on Public School Facilities
*Some areas of "steel-frame and other buildings" and "wooden buildings" are converted to an area equivalent to reinforced concrete buildings.
*The figures in the brackets are averages of the years before and after.
*The figures before fiscal year 1992 do not include Okinawa Prefecture.
*The figures before fiscal year 1968 do not include dormitories.

Progress in the Enhancement of Earthquake Resistance (Public Elementary and Lower Secondary Schools)

The ratio of the earthquake resistance enhancement completion in public elementary and lower secondary school facilities is 84.8% as of April 2012. The ratio is expected to increase to about 93% with the FY2012 budget.



(Prepared based on the Study of the Enhancement Refurbishment of the Earthquake Resistance of Public School Facilities)

Earthquake Resistance Enhancement by Establisher

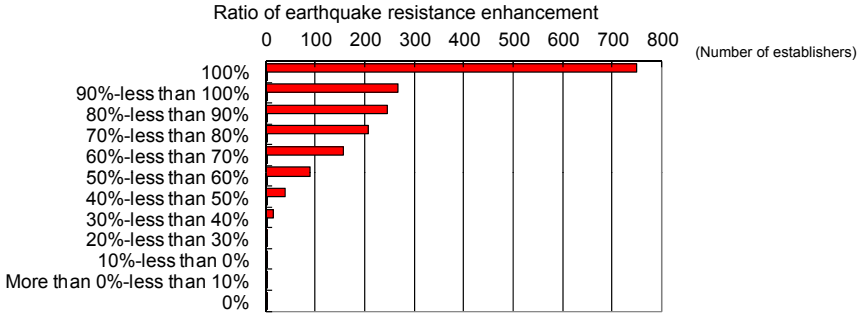
●Distribution of ratio of earthquake resistance enhancement by establisher

The ratio of the earthquake resistance enhancement completion (April 1, 2012)*

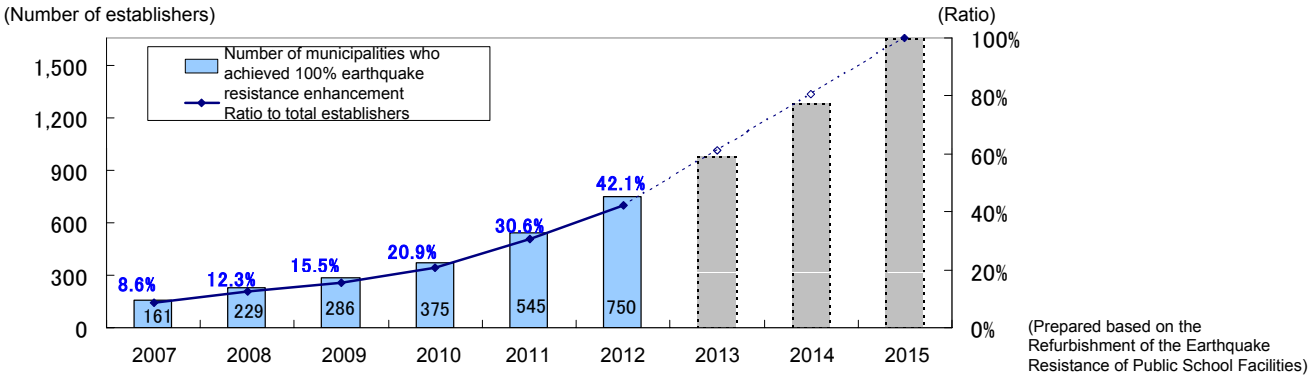
Ratio of earthquake resistance	Number of establishers	Ratio
100%	750	42.1%
90%-less than 100%	267	15.0%
80%-less than 90%	245	13.8%
70%-less than 80%	208	11.6%
60%-less than 70%	156	8.8%
50%-less than 60%	89	5.0%
40%-less than 50%	39	2.2%
30%-less than 40%	15	0.8%
20%-less than 30%	3	0.2%
10%-less than 0%	3	0.2%
More than 0%-less than 10%	1	0.1%
0%	4	0.2%
Total	1,780	100.0%

* Excluding part o Miyagi and Fukushima Prefectures

About 40% of the municipalities achieved 100% earthquake resistance (April 2012). This rate is expected to increase after FY2012



●Changes in the number of establishers who achieved 100% earthquake resistance enhancement



(Prepared based on the Refurbishment of the Earthquake Resistance of Public School Facilities)

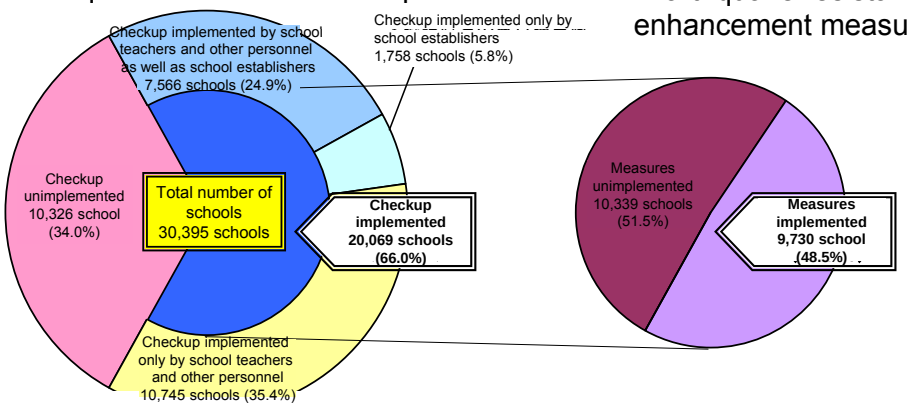
Measures for Earthquake Resistance of Non-structural Parts and Materials (Public Elementary and Lower Secondary Schools)

While the implementation ratio of earthquake resistance enhancement measures of public elementary and lower secondary schools (structure of buildings) has reached 84.8%, that for non-structural parts and materials, such as ceilings, remains at 32.0%.

Non-structural parts and materials: Parts and materials except for the structure of a building, including ceiling materials, lighting equipment, window glass, exterior and interior materials, equipment, and furniture.

Earthquake resistance checkup

Earthquake resistance enhancement measures



As of April 1, 2012

Among all schools, the implementation ratio of earthquake resistance enhancement measures for non-structural parts and materials: 32.0% (29.7% in the previous fiscal year)

(Study of the Earthquake Resistance Checkup and the Earthquake Resistance Enhancement Measures for the Non-Structural Parts and Materials of Public School Facilities)

Examples of Damage, etc. Caused by Deterioration

Various defects have been evidenced in terms of both safety and function due to the deterioration of facilities

Notable deterioration of exterior materials

Fallen concrete slabs due to deterioration

Frequent rain leaks due to deterioration of roof coating

Pipes break quite often

Fallen mortar due to deterioration

Level difference on a floor surface

Toilet odor due to deterioration

Accidents Caused by Deterioration (1) (Falling of Window Frame)

February 2009
Year of construction: March 1978 (31 years since built)
Damage: Damage to a car parked right under the window

The window's original position

Fallen window frame

Possible cause
The latch in the upper frame slipping off

March 2010
Year of construction: March 1987 (22 years since built)
No harm

The window's original position

Fallen and broken window frame

Possible cause
Deterioration of a sash roller (space between the sash and the frame was widened due to a sash roller wearing off).

*Cited from "Maintenance and Management of the Existing School Facilities" (Notice of Director of Facilities Planning Division, Department of Facilities Planning and Administration, Ministry of Education, Culture, Sports, Science and Technology, August 16, 2010)

Accidents Caused by Deterioration (2) (Falling Railing)

April 2010
Year of construction: June 1975 (35 years since built)
Outline: When two students leaned against a balcony railing outside a classroom on the second floor, the railing collapsed and they fell, **causing one a broken heel bone, and another bruising to the head**.

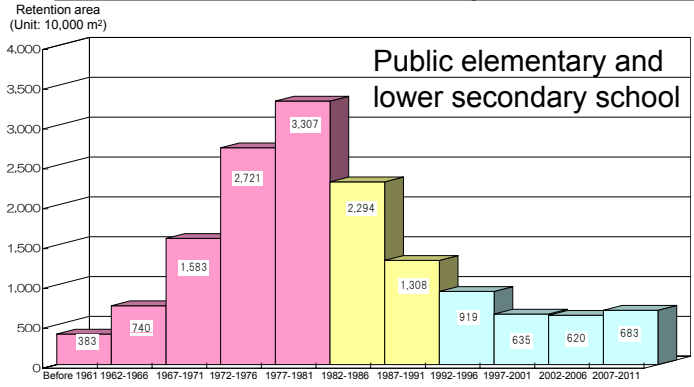
Junction of the railing (support)

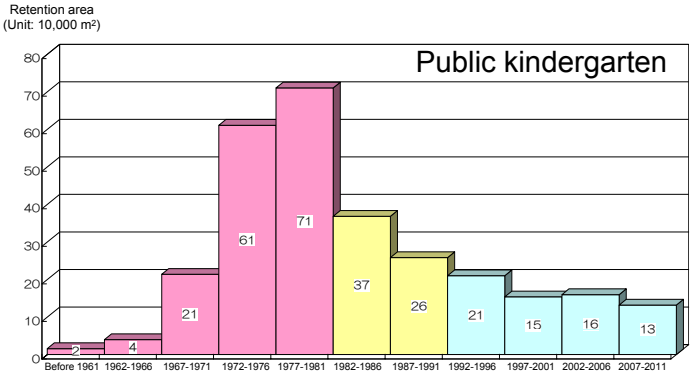
Possible cause
Rain and sea breeze enters into a gap between the railing, made of precast concrete, and the balcony prop, corroding the fitting metals.

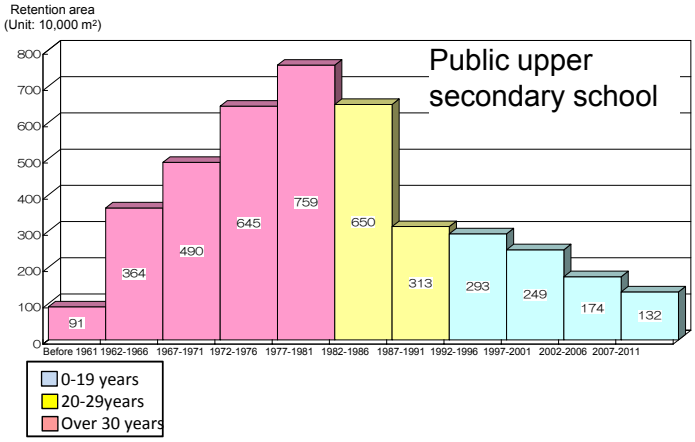
* Cited from "Further enhancement of the Maintenance and Management of the Existing School Facilities (request)" (Notice of Director of Facilities Planning Division, Department of Facilities Planning and Administration, Ministry of Education, Culture, Sports, Science and Technology, April 23, 2010)

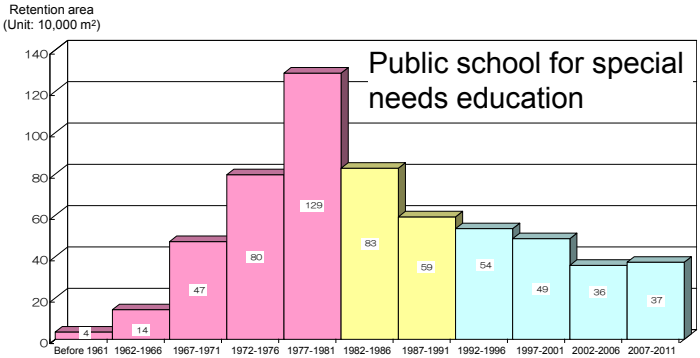
Retention Area by Age

Deterioration is progressing not only at elementary and lower secondary schools, but also kindergartens, upper secondary schools and schools for special needs education.





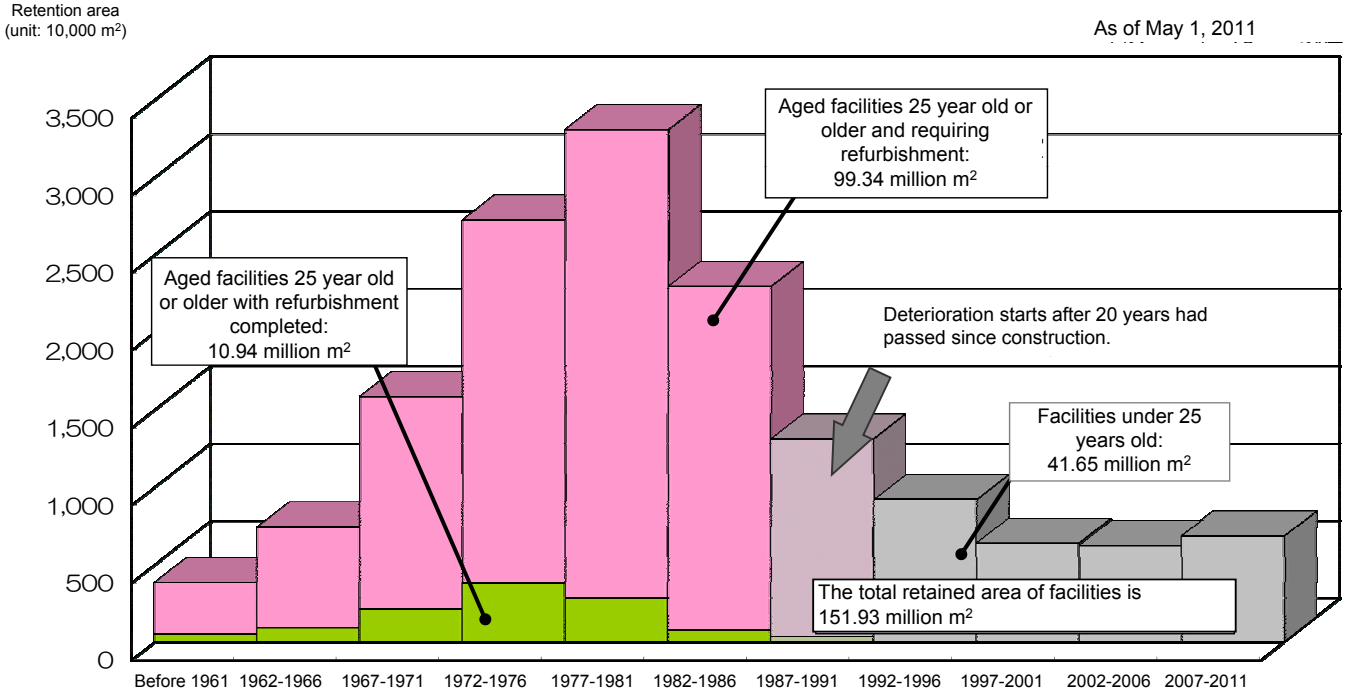




* Excluding Iwate, Miyagi, Fukushima Prefectures
* As of May 1, 2011
* The figures for schools for special needs education are those for schools for the blind, the deaf, and the otherwise disabled until FY2006.

Retention Area by Age (Public Elementary and Lower Secondary Schools)

Aged facilities over 25 years old that require refurbishment cover 99.34 million m², accounting for nearly 70% (65.4%) of the total area.

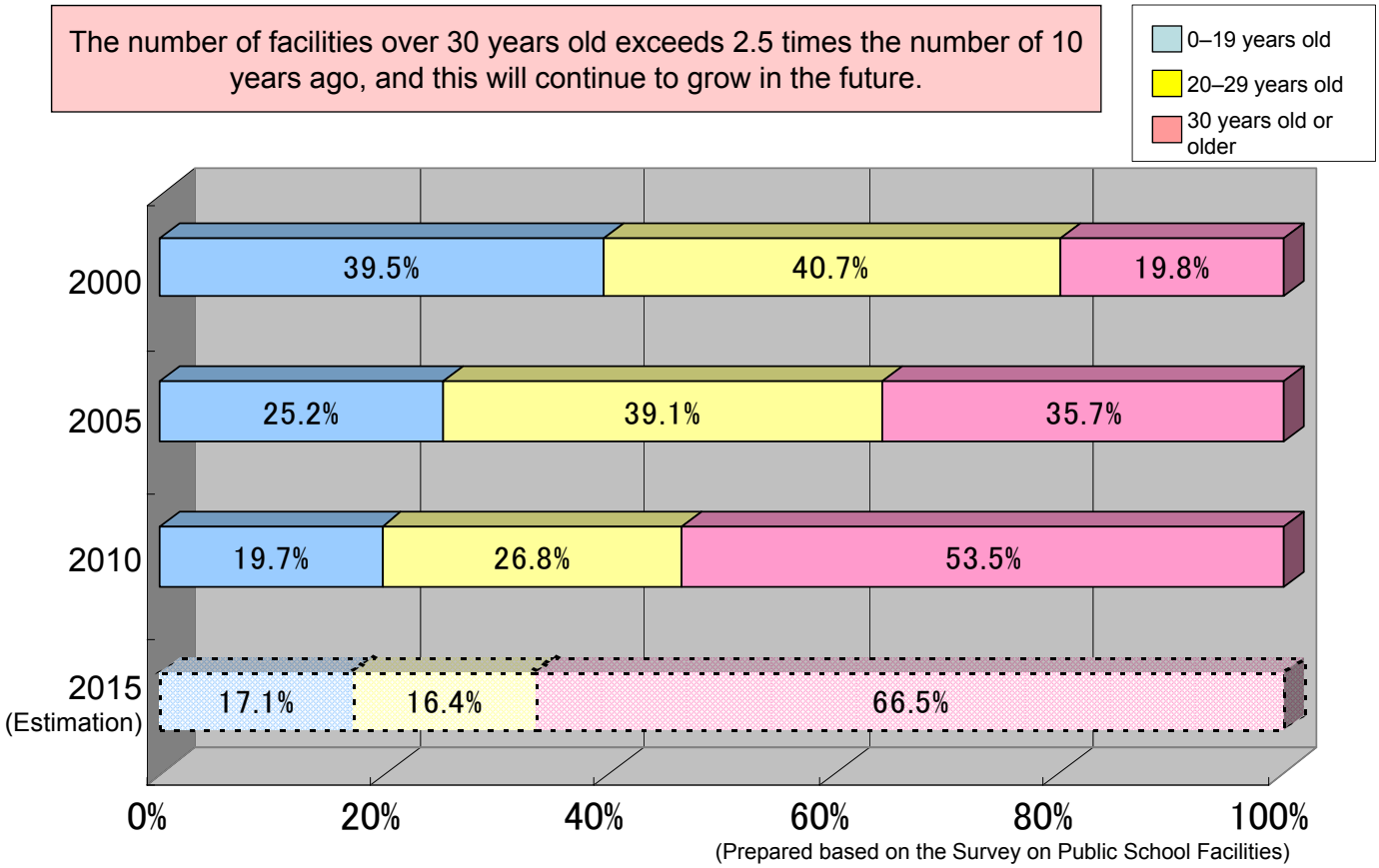


* Excluding Iwate, Miyagi and Fukushima Prefectures
* "Aged facilities that require refurbishment" includes buildings with areas of 200m² or less

(Prepared based on the Survey on School Facilities)

Changes in the Ratio of Retention Area by Age (Public Elementary and Lower Secondary Schools)

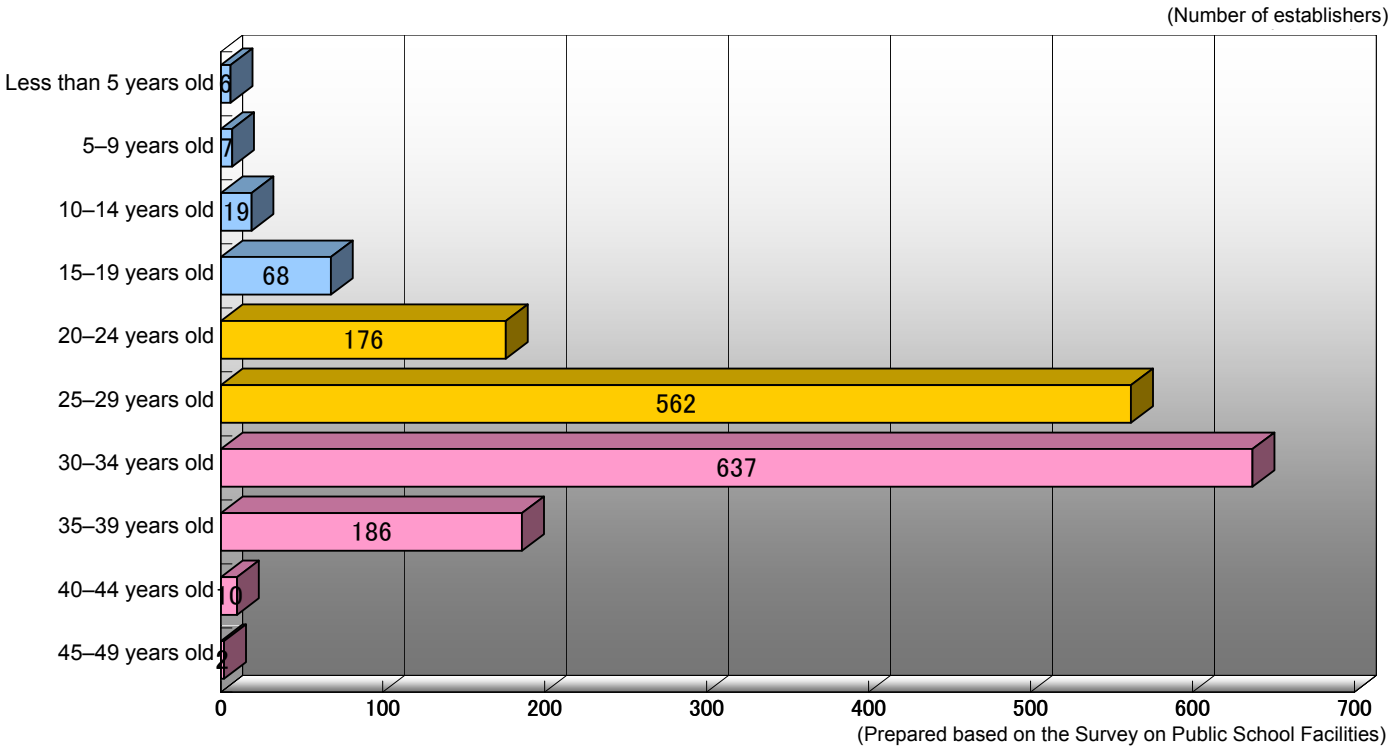
The number of facilities over 30 years old exceeds 2.5 times the number of 10 years ago, and this will continue to grow in the future.



(Prepared based on the Survey on Public School Facilities)

Distribution of Average Ages of Establishers (Public Elementary and Lower Secondary School)

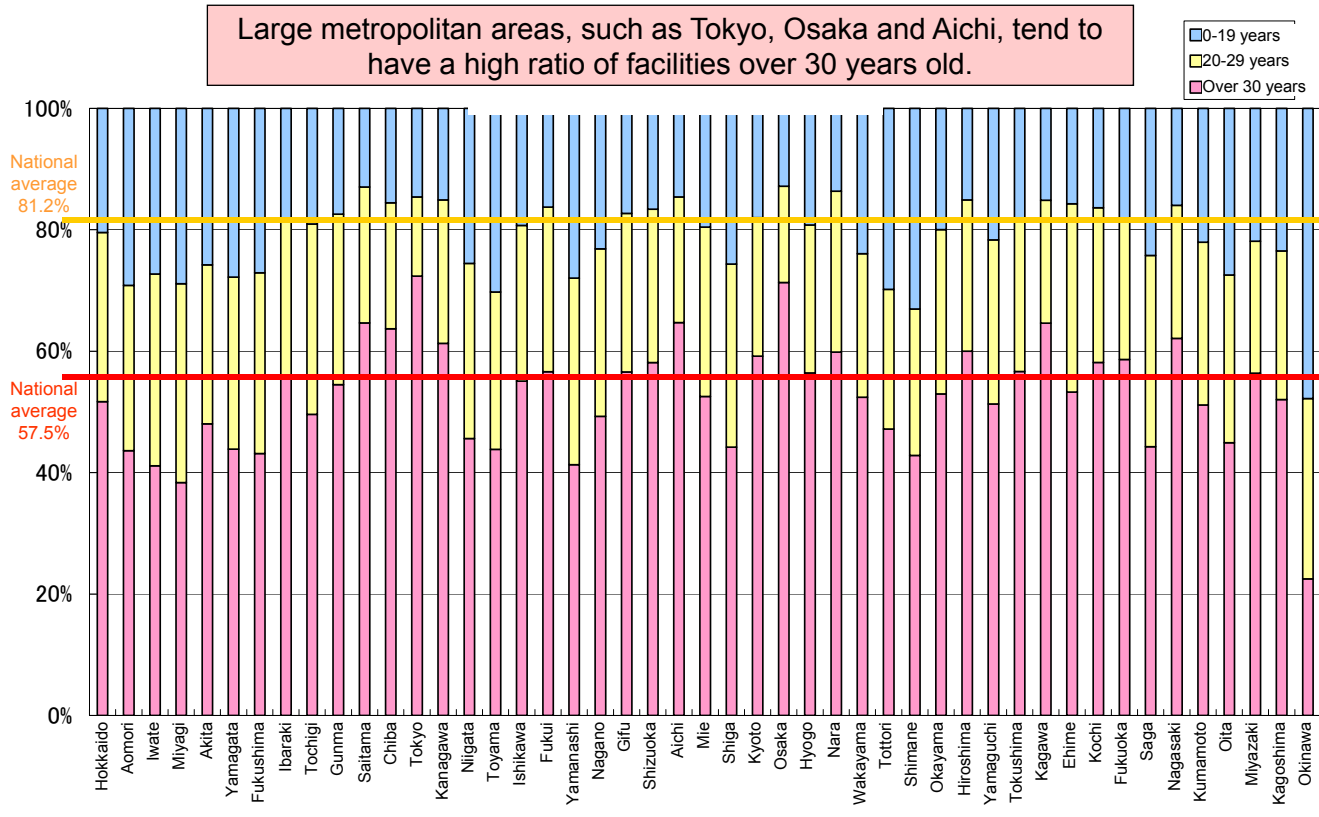
About half of the public elementary and lower secondary school facilities owned by municipalities were built more than thirty years ago.



(Prepared based on the Survey on Public School Facilities)

Retention Area by Age (Public Elementary and Lower Secondary Schools by Prefecture)

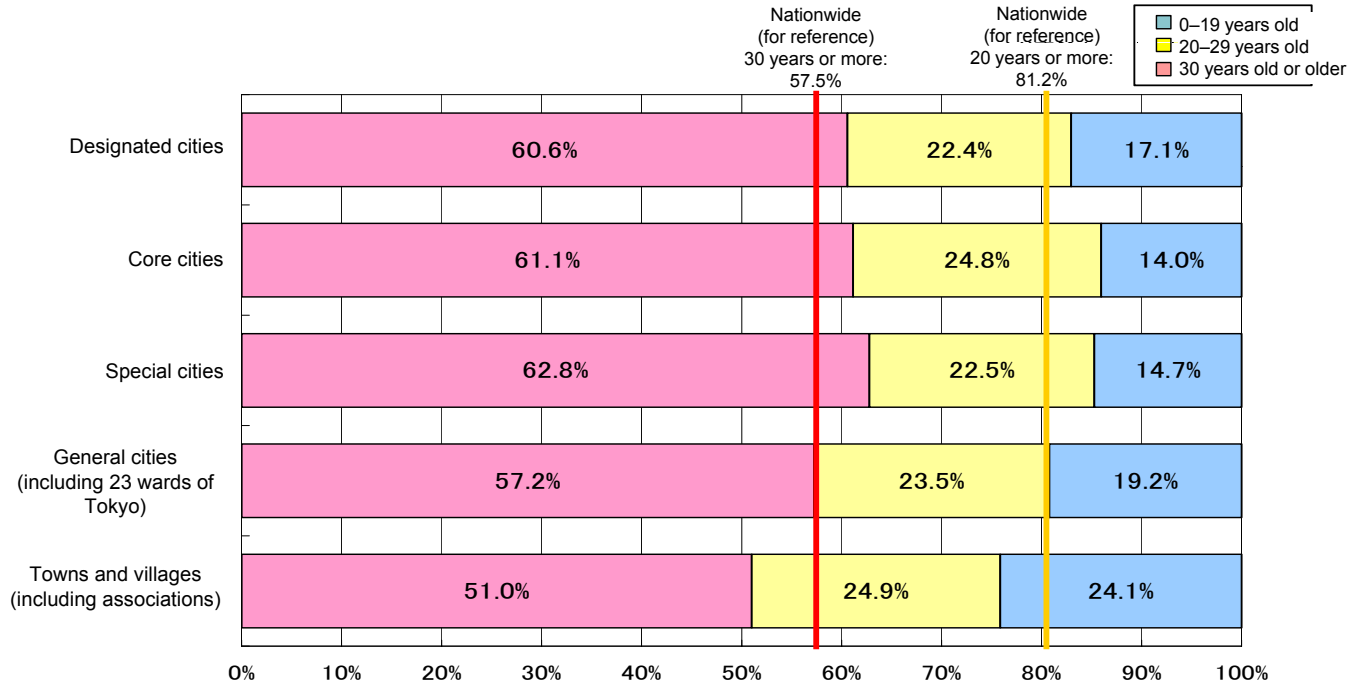
Large metropolitan areas, such as Tokyo, Osaka and Aichi, tend to have a high ratio of facilities over 30 years old.



*Prepared based on the Survey on Public School Facilities
*As of May 1, 2011
(Figures for Iwate, Miyagi and Fukushima Prefectures are as of May 1, 2010)

Retention Area by Age (by Categorization of Municipality)

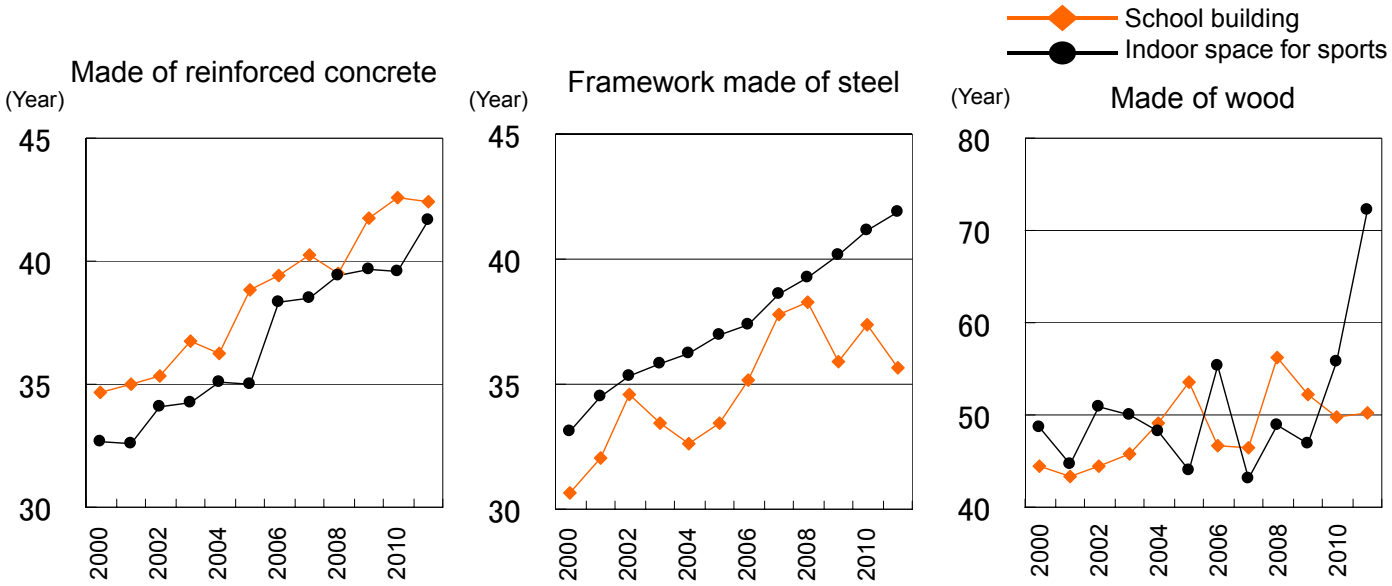
Designated cities, core cities and special cities tend to have more deteriorated facilities than national average.



* Prepared based on the Survey on Public School Facilities
* Facilities not made of wood with an area of 200m^2 or more are included
* Excluding Iwate, Miyagi and Fukushima Prefectures

Average Years Until Reconstruction

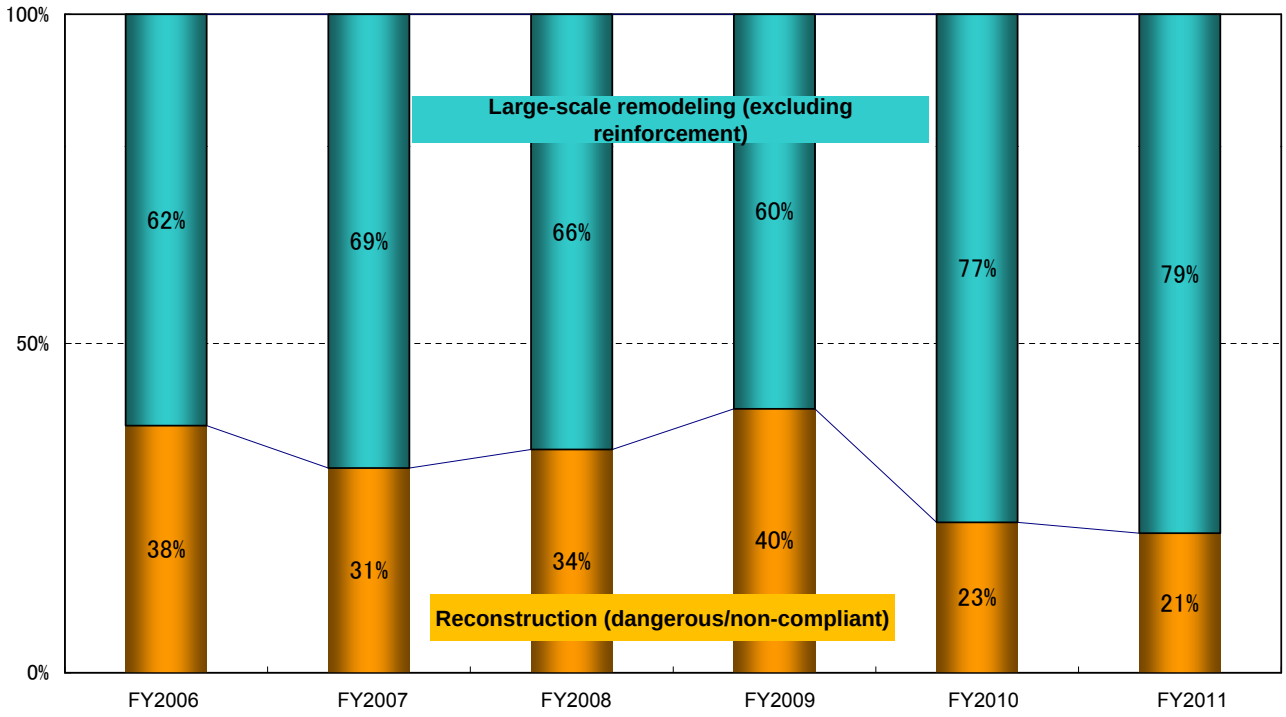
The average years until the reconstruction of school facilities is approximately 42 years in the case of buildings made of reinforced concrete, and the reconstruction cycle has tended to be longer recently.



Prepared based on the Survey on Public School Facilities
- Data for FY2000–2005 are extracted from the FY2005 survey, and data for FY2006–2011 are extracted from the FY2011 survey.
- Extraction condition: Facilities with an area of 200 m^2 or more and being operated for 10 years or more
* As for school buildings made of wood and indoor spaces for sports made of wood, the fluctuation of figures is too large because the data parameters are too small.

Changes in the Ratio of Large-scale Reconstruction/Remodeling Projects

The number of projects for large-scale remodeling is on an increasing trend

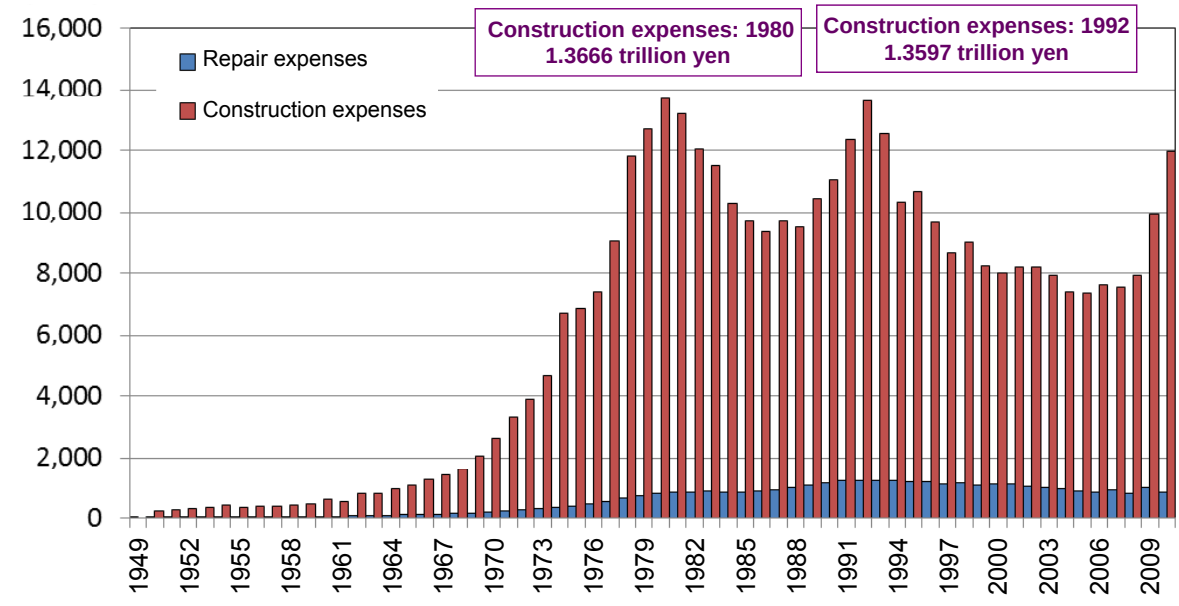


Prepared based on the number development projects of public school facilities

Changes in the Construction and Repair Expenses of Public Elementary and Lower Secondary Schools

Construction expenses peaked at more than ¥1.2 trillion about 20 to 30 years ago, and have been maintaining the level of about ¥800 billion in recent years. Demand for renewal of the school facilities built during the peak period is expected to grow in the future.

(100 million yen)

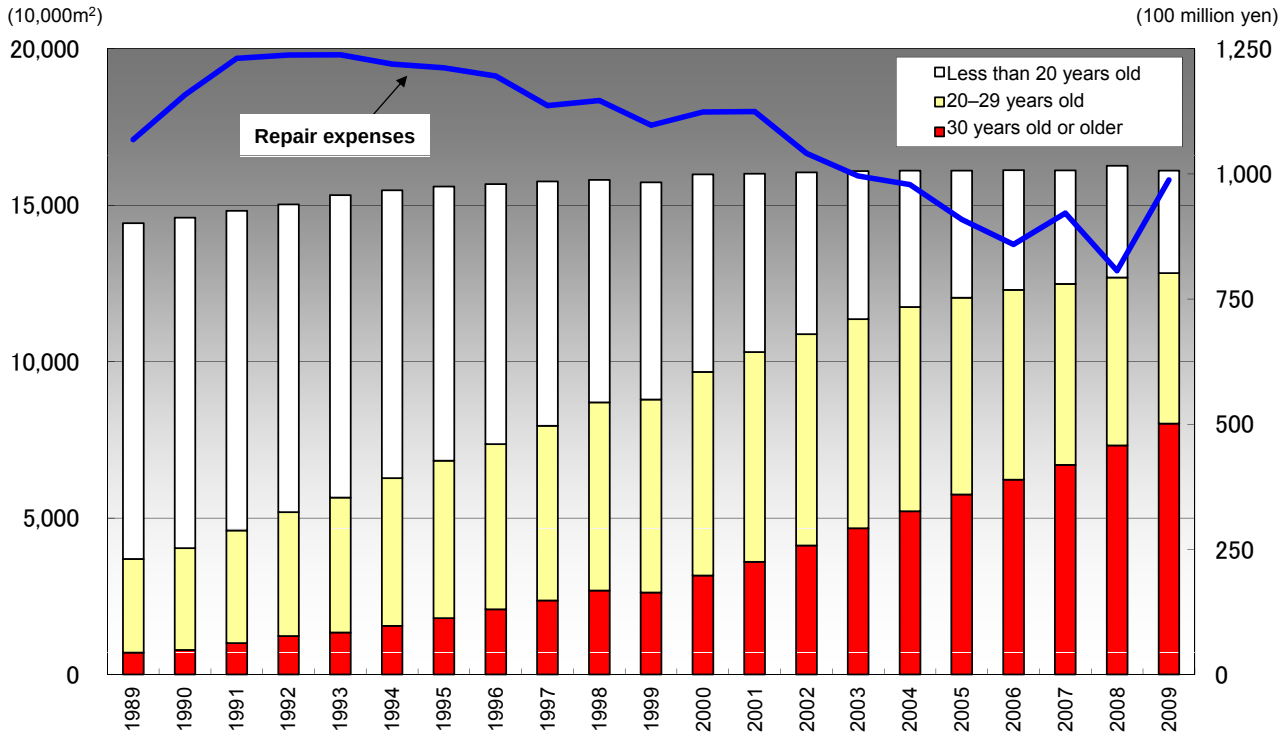


(Prepared based on the Survey on Local Educational Expenditure)

3. Conditions of deterioration

Changes in Retention Area by Age and Repair Expenses

Although the area of aged facilities over 30 years old has increased, the repair expenses have been declining.



(Retention areas by age are based on the Survey on Public School Facilities and repair expenses are based on the Survey on Local Education Expenditure.)

4. Initiatives of MEXT

Basic Policy on the Improvement of School Facilities and Basic Plan for the Improvement of School Facilities

Government subsidy for the development of public school facilities

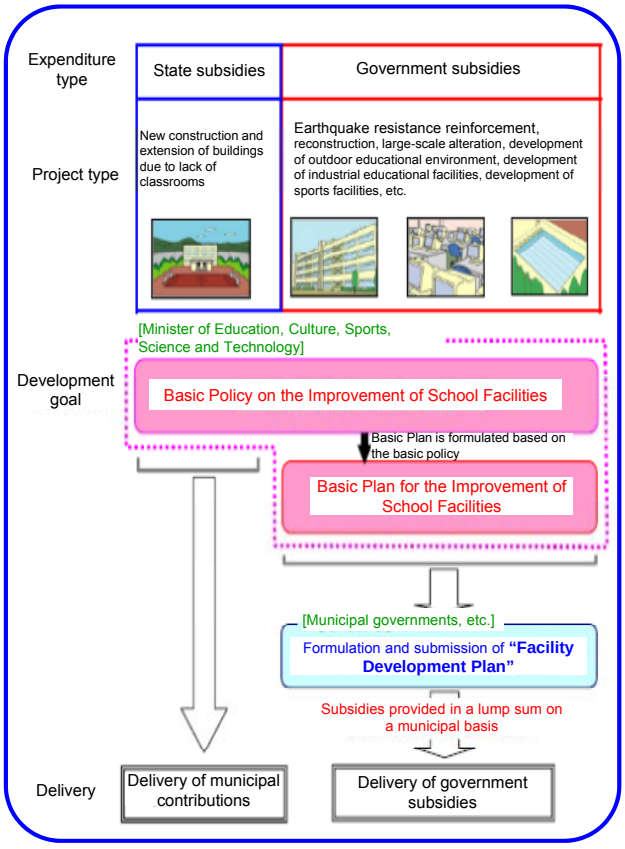
○State subsidies: New construction or extension of buildings, etc.

○Government subsidies: Earthquake resistance reinforcement, reconstruction of school buildings, and large-scale remodeling, etc.

Basic Policy on the Improvement of School Facilities and Basic Plan for the Improvement of School Facilities

○**The system was drastically revised in FY2006**. Along with an introduction of subsidies, the system has changed to one in which **the Basic Policy on the Improvement of School Facilities and the Basic Plan for the Improvement of School Facilities are to be formulated, setting out the targets of facility development.**

○**The first Basic Policy on the Improvement of School Facilities of FY2006 stipulates that the policy shall be reviewed in around five years time. It was thus revised in May 2011.**



Revision of the Basic Policy on the Improvement of School Facilities and the Basic Plan for the Improvement of School Facilities

Revised Basic Policy on the Improvement of School Facilities (Revision Notice of MEXT, May 24, 2011)

- ○ Special Measures Law on Earthquake Disaster Prevention was amended in March 2011 **for public school facilities without adequate earthquake resistance**, which extended the period of the government subsidies for earthquake resistant projects for public schools until FY2015. Based on this, the Basic Policy lists the goal that **the earthquake resistance work shall be completed at the earliest possible time before FY2015.**
- ○ The Policy stipulates the **promotion of earthquake resistant non-structural materials**, such as ceiling materials and exterior materials, in addition to the earthquake resistance of buildings.
- ○ The Policy stipulates to **strengthen disaster prevention functions** of school facilities so as to fulfill the role of an emergency evacuation center in the event of a disaster, such as an earthquake.
- ○ The aging and deterioration of public school facilities are becoming increasingly serious. The Policy stipulates to **promote countermeasures against deterioration** in order to protect the safety of children and students and to develop a comfortable and profound educational environment.
- ○ The Policy lists the **promotion of Eco-schools**, with consideration to the environment, **the promotion of developing facilities adequately responding to the introduction of new energy, including solar power, and various social needs, such as digitization of education**. It also spells out the **promotion of facility development through measures such as the creation of complexes with social education facilities and welfare facilities, such as citizen's public hall**.

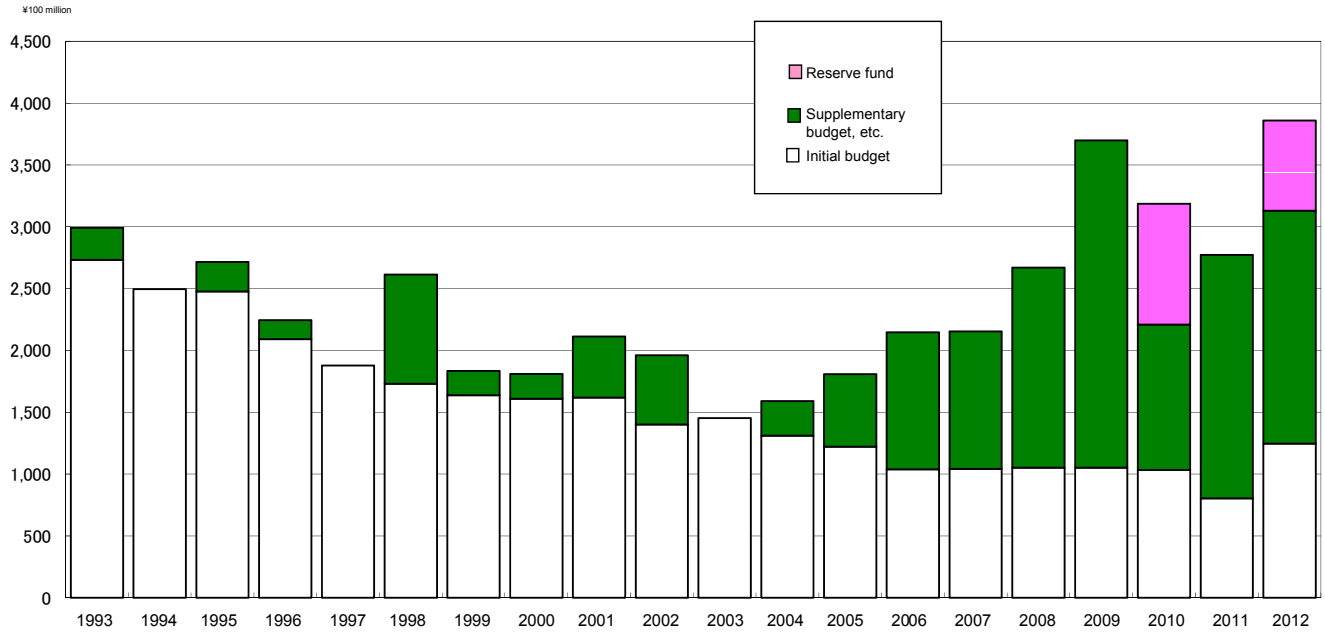
Revised Basic Plan for the Improvement of School Facilities (Revision Notice of MEXT, May 24, 2011)

Based on the revised Basic Policy on the Improvement of School Facilities, the Plan specifies the following projects as being necessary for achieving the goals of the facility development plans drawn up by municipal governments: **"earthquake resistance reinforcement of non-structural materials", "strengthening of disaster prevention functions", "renewal of deteriorated facilities", "development of school facilities giving consideration to the environment, such as solar power generation", and "development of intra-school LAN".**

Changes in Budgets for the Development of Public School Facilities (FY1993-FY2012)

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
(¥100 million) Budget	(259) 2,732	2,497	(238) 2,478	(152) 2,092	1,878	(882) 1,731	(197) 1,638	(200) 1,610	《310》 (184) 1,619	(560) 1,402	1,452	(280) 1,311	(587) 1,221	(1,107) 1,039	(1,111) 1,042	《500》 (1,119) 1,051	《△131》 (2,778) 1,051	《978》 (1,177) 1,032	《1,627》 (340) 805	《730》 (1,884) 1,246

(Note) Figures in the upper brackets indicate the amount included in the supplementary budget, etc. For FY2001, 2008 and 2009 the figures in the middle indicate the first supplementary budget and those on the top the second supplementary budget. For FY2009, the figure indicates the execution stayed. For FY2010 and 2012 the figures in the middle indicate the supplementary budget and those on the top the reserve fund.
For FY2011 the figures in the middle indicate the first supplementary budget and on the top the third supplementary budget. The reserve fund for FY 2012 is the sum of the reserve fund for Local Revitalization in Response to Economic Crisis (¥14.9 billion) and the reserve fund for Special Account for Reconstruction from the Great East Japan Earthquake. (¥58.1 billion)



Outline of Projects for the Development of Public School Facilities

1. Purpose

To guarantee the smooth implementation of school education by providing government subsidies for some of the expenses needed for the development of public school buildings (buildings and gymnasiums of public elementary and lower secondary schools, schools for special needs education and kindergartens), in order to ensure equal opportunities, etc. and maintain and improve the level school education, pursuant to the "Act on National Treasury's Sharing of Expenses for Facilities of Compulsory Education Schools, etc."

2. Subsidy ratio in major subsidized projects

Project name	Subsidy Ratio (calculation)	Project details
New construction or extension	1/2	New construction of or extension work for school buildings (buildings, gymnasiums, etc.) (solution to lack of classrooms, school integration)
Reconstruction	1/2 (raised)	Reconstruction of buildings that have a high risk of collapse during an earthquake (I.S. value = less than 0.3) but are difficult to reinforce for compelling reasons
	1/3	(Other than above)
Earthquake resistance	2/3 (raised)	When there is a high risk of collapse during an earthquake (I.S. value = less than 0.3)
	1/2 (raised)	When there is a risk of collapse during an earthquake (I.S. value = 0.3 – 0.7)
Large-scale remodeling	1/3	Refurbishment without reconstructing the existing school buildings, such as environment-focused refurbishment or repair work on deteriorated buildings
Martial arts gym	1/2 (New construction) 1/3 (Reconstruction)	Building Judo halls and Kendo halls in lower secondary schools
Installation of solar power generator	½	Introducing renewable energy, such as solar power generation, etc.
Other	1/3	Outdoor education environment, school swimming pools, social physical education facilities, school lunch facilities, etc.

I.S. value: (Seismic Index of Structure): An index to evaluate the structural seismic capacity of a building. The larger the I.S. value is, the more earthquake-proof the building is.

Outline of Reconstruction Project

1. Reconstruction of dangerous buildings

○ Purpose
To ensure the smooth implementation of education at public schools by partially subsidizing the cost of reconstruction of structurally dangerous buildings.

○ Subsidy requirements (in the case of non-wooden buildings)
Any building with the score in **Strength Evaluation (see next page),** whose parameters include structural strength, degree of maintenance and external conditions of a building, is less than 4500 points (out of 10,000 points*) is evaluated as a structurally dangerous building.
(* The score for buildings which performed the Strength Evaluation before FY2007 is less than 5000 points).

○ Subsidy ratio
1/3 in principle

2. Reconstruction of non-compliant buildings

○ Purpose
To improve educational conditions by partially subsidizing the cost of reconstruction of buildings extremely inadequate for education in special circumstances.

○ Subsidy requirements
・Buildings lacking earthquake resistance (Is value = less than 0.3, etc.)
・Meeting the conditions for full-scale reconstruction or for appropriate allocation.

○ Subsidy ratio
1/3 in principle

Strength Evaluation

Summary

To comprehensively evaluate the deterioration of public school facilities by comprehensively examining the degree of deterioration of a building using three factors: (1) strength of a building, (2) reduced strength due to aging and (3) impact of locational factors.

Strength evaluation score = (1) structural strength × (2) degree of maintenance × (3) external factors

(1) Evaluation factors for structural strength : horizontal strength, modulus of rigidity, eccentricity ratio, concrete compressive strength, inter-story deflection angle, foundation structure, materials used for the structure
(2) Evaluation factors for degree of maintenance: years since construction, depth of concrete carbonation and thickness of concrete coating of reinforcing steel, degree of concrete corrosion, degree of uneven settlement, cracks and degree of prostration due to fire
(3) Evaluation factors for external factors: seismic zoning coefficient, ground classification, cold snowy region, distance from seashore

Evaluation criteria

A building with less than the required strength score shall be regarded as “a structurally dangerous building” and be eligible for a subsidy for a project to reconstruct dangerous buildings (500 of the preferential points may be applied to some regions/school types, etc.)

Structure of a building	Score of strength (Full marks of 10,000)
Reinforced concrete Steel frame Reinforced concrete block	Less than 4,500(*)
Wooden	Less than 5,500

* Since seismic evaluation has been widely spread and earthquake resistance technology has advanced, requirements for reconstruction of dangerous buildings due to low seismic capacity have been reviewed and the score was lowered by 500 points in FY2006.

Outline of Large-scale Remodeling Project (due to deterioration)

[Established in 1983]

《Objectives》

- Recovery measures against wear/loss and reduced functions of school buildings due to aging.
- To improve the educational environment, contributing to the smooth implementation of school education and to ensure the durability of buildings

《Eligibility》

- Buildings **built at least 20 years ago**
- Work to remodel **both external and internal parts** simultaneously
- Work **to alter more than 70% of the total floor space of a building**

《Subsidy ratio》

1/3 (2/7 for an establisher with a financial index of over 1.0)
Lower limit: ¥70 million (per school) [includes the cost of earthquake resistance work when the earthquake resistance work is carried out simultaneously]
Upper limit: ¥200 million (¥300 million in the case of municipalities with a drastic increase in aged buildings)
* In the case of small schools (less than 800 m^2 of each building section): ¥10 million (per school)

《Effect》

- To ensure the safety of facilities by taking measures (refurbishment) against deterioration of construction materials (prevention of accidents involving falling due to damaged floors, etc.)
- Improvements in educational environment are well expected by carrying out refurbishment in response to the change in educational content and methods.

Changes in the Systems Regarding Large-scale Remodeling Projects (due to deterioration)

Since its establishment in 1983, the upper and lower limits have been gradually revised under the appropriate role sharing between the central and local governments in line with the actual situations of the development of municipalities.

1983
Cost of large-scale refurbishment <Establishment of subsidy>
(Target areas)
・Remote islands, heavy snowfall regions, typhoon-prone areas, and areas eligible for Intensified Measures against Earthquake Disasters
(Target schools)
・Municipal elementary and lower secondary schools
Schools for special needs education (elementary and lower secondary divisions)
(Subsidy ratio)
・ 1/3
(Target project)
・Non-wooden buildings built at least 15 years ago
・Lower limit: ¥20 million; Upper limit: ¥100 million

1985
(Target areas)
・Removal of regional restriction (targeting the whole nation)
(Subsidy ratio)
・2/7 (municipalities with a financial index of over 1.0)

1988
Name has been changed to large-scale remodeling
(Target schools)
・Addition of prefectural schools for special needs education (elementary and lower secondary divisions)
(Target project)
・Easing of lower limit for small schools from ¥20 million to ¥10 million

1989
(Target school)
・Addition of municipal kindergartens
(Target project)
・Addition of wooden buildings over 15 years old
・Lower limit: ¥4 million (kindergarten)

1992
(Target project)
・Buildings over 20 years old: from 15 years old to 20 years old
・Lower limit: ¥40 million; Upper limit: ¥150 million
(Lower limit from ¥20 million to ¥40 million
Upper limit from ¥100 million to ¥150 million)

1995
(Target project)
・Lower limit: ¥50 million; Upper limit: ¥200 million
(Lower limit from ¥40 million to ¥50 million
Upper limit from ¥250 million to ¥200 million)

1997
(Target project)
・Lower limit: ¥70 million
(Lower limit: ¥50 million to ¥70 million)

1998
(Target project)
・Upper limit: ¥300 million (limited to municipalities with a drastic increase in aging buildings)

Outline of Large-scale Remodeling (due to deterioration: environment-focused refurbishment)

[Established in 2011]

《Objectives》

・Deterioration of school buildings is serious, and implementation of refurbishment is an urgent task
・Need to achieve energy saving plan formulated based on the revised Rationalization in Energy Use Law
・Need to improve indoor thermal environment as measures against fierce heat, etc.

⇒Promote effective and well planned refurbishment with due consideration to environment

《Eligibility》

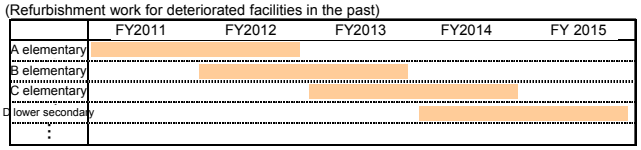
Buildings over 20 years of age

《Subsidy ratio》

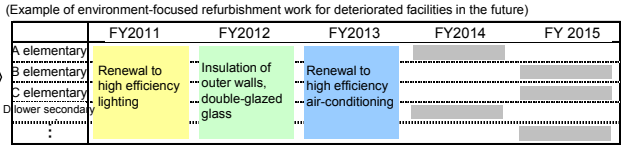
1/3 (2/7 for establishers with a financial index of over 1.0)
Lower limit: ¥70 million per municipality or more than ¥4 million per project
Upper limit: ¥200 million (¥300 million for municipalities with drastic increasing in aging buildings)
* In the case of small municipalities (less than 6 elementary and lower secondary schools) the lower limit is ¥10 million per municipality or more than 4 million per project.
* The ratio of cost of environment-focused refurbishment to the total cost for refurbishment work for deteriorated facilities needs to be over 50% per building type

《Cases》

(Refurbishment work for deteriorated facilities in the past)



(Example of environment-focused refurbishment work for deteriorated facilities in the future)



The establishment of a large-scale remodeling (refurbishment of deteriorated facilities/environment-focused refurbishment) project made it possible to carry out the work individually in a planned and effective manner

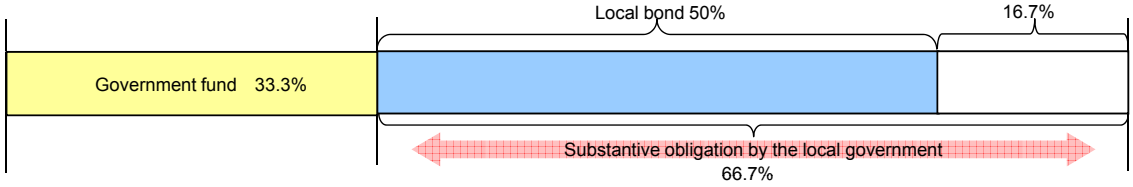
《Benefits》

・Can be implemented in the order of higher cost-efficiency
・Environment of many schools can be improved simultaneously
・Cost can be cut through blanket order

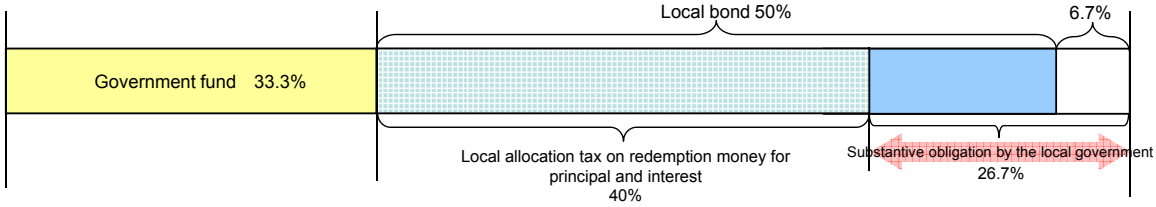
Financial Measures for Local Governments for Deteriorated Facility-related Projects (FY2012)

* Case of implementation as a project financed by the general account

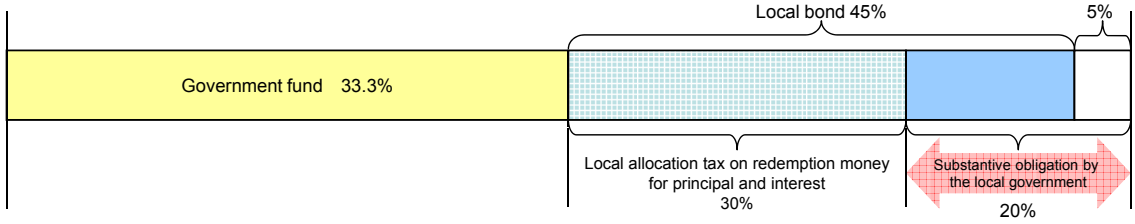
○Details of financial sources for large-scale remodeling projects (of deteriorated facilities)



○Details of financial sources of reconstruction project



[Reference] Details of financial sources of new construction or extension work



Cost of Maintenance and Management of Public School Facilities

1. Purpose

Ordinary maintenance and repair work and small-scale improvements are to be decided and carried out by an establisher appropriately when necessary; however, necessary measures shall be taken for the cost of maintenance and management, through tax allocation to the local government.

2. Measures against deteriorated buildings

Local bond measures shall be taken for the following projects conducted by a local government alone

○Project
Building: School buildings and indoor sports facilities over 15 years old at elementary and lower secondary schools, secondary education schools (the first term) and schools for special needs education (elementary and lower secondary divisions)
Work: Partial or entire remodeling
Lower limit: ¥20 million or more
○Bond issuance rate of prefectural or municipal government
75% of the project cost (Local bond measures shall be allocated to 30% of redemption money for principal and interest)

3. Measures for the maintenance and management cost of buildings (FY2011)

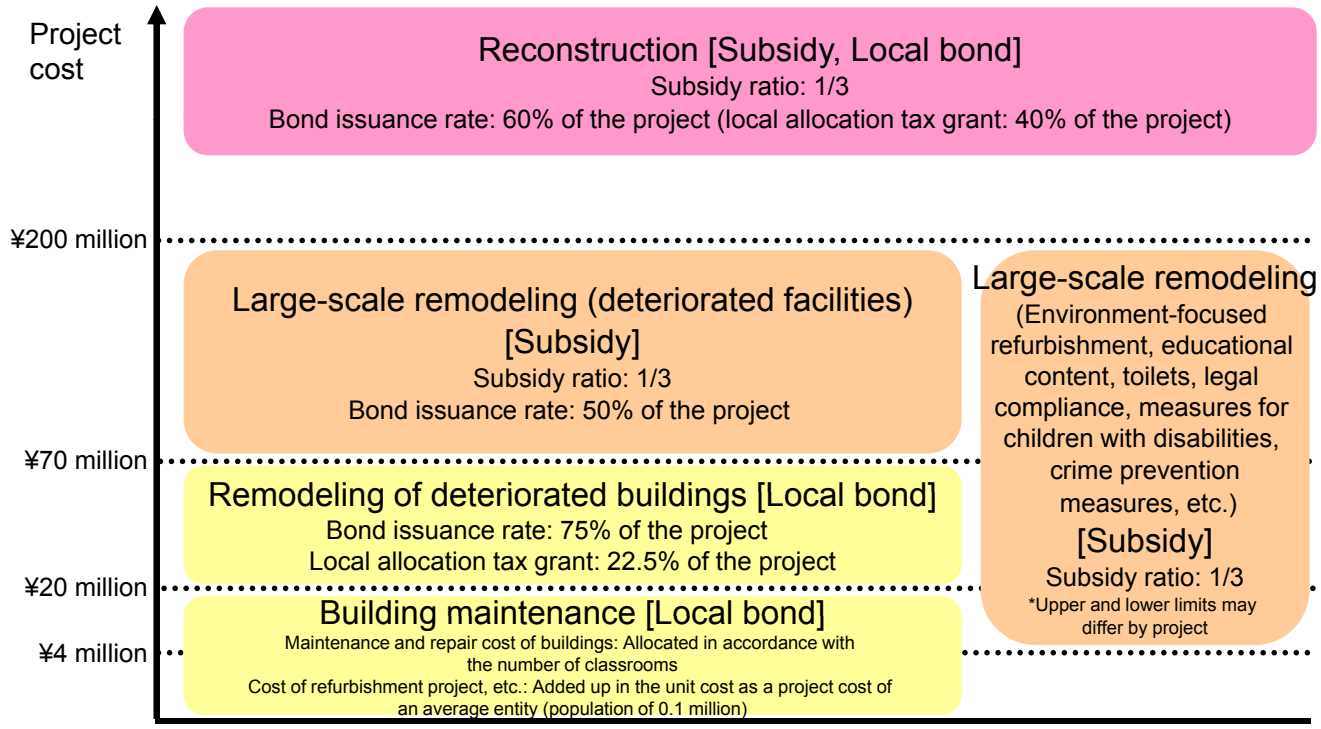
Cost of maintenance and management is calculated in the unit cost of local allocation tax as follows

○Individually calculated cost (maintenance and repair cost of buildings)
¥3.27 million per 18 classes of elementary school
¥3.54 million per 15 classes of lower secondary school
○Comprehensively calculated cost (cost of refurbishment project) *Added to unit cost as a project cost of a standard entity (population of 100 thousand)
For elementary school: ¥145 million
For lower secondary school: ¥67 million

Example of Financial Measures to Address Deteriorated Facilities

(Case of municipalities/schools of average size / FY2012)

From the viewpoint of role sharing between the national and local governments, a large-scale project over 70 million yen is eligible for a subsidy, in principle. Other projects are to be carried out by local governments alone. However, financial support by the national government is partially provided for a project deemed necessary to be implemented to address individual issues from the political viewpoint.



Area Required for Public School Facilities

1. Required area (Standard area for national subsidy)

Required area is the standard area necessary for ensuring the implementation of school education in line with the education guidelines and the area is specified by school type and building type.
It does not specify the area of individual rooms, such as classrooms, to allow each establisher to flexibly develop diverse school facilities, but provides the total area in accordance with the school size.
Required area undergoes necessary changes based on the revision of education guidelines, etc., responding to diversification of education content/methods, etc.

2. Example of required area for elementary and lower secondary schools (current)

(Temperate region)

School type	6 classes	12 classes	18 classes	24 classes
Elementary	2,468 m²	3,881 m²	5,000 m²	6,038 m²
Lower secondary	3,181 m²	5,129 m²	6,088 m²	7,390 m²

*When installing multi-purpose space, 18.0% and 10.5% may be added to the space above for elementary schools and lower secondary schools, respectively.
*For snowy cold regions, the required area may increase.

(Reference) Example of required area in 1964 when the standard was created in accordance with the number of classrooms

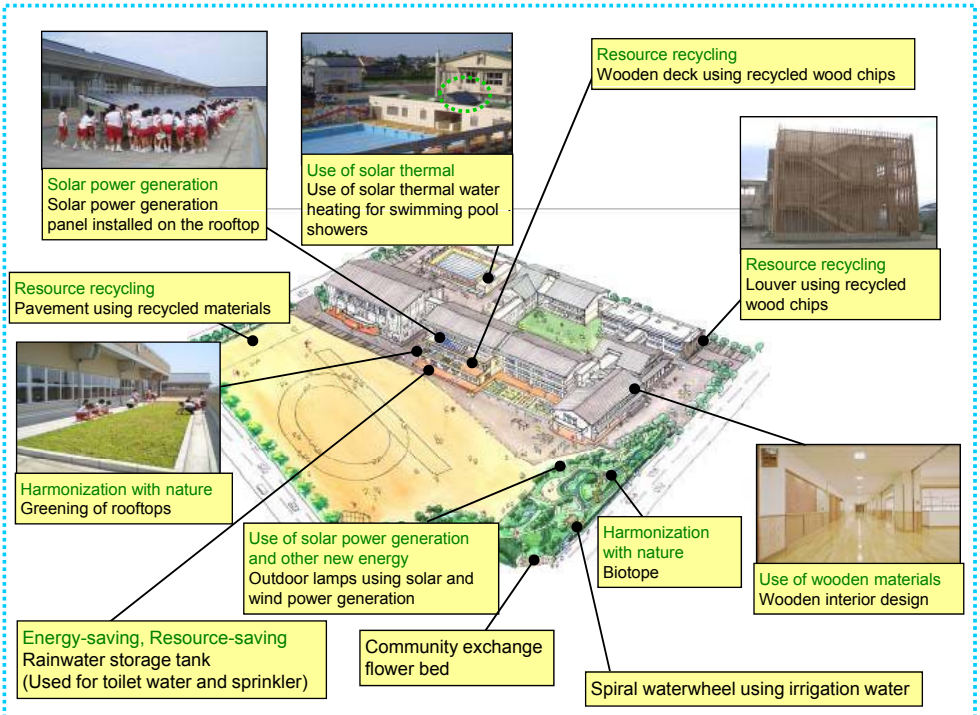
→ About half of the current standard

(Temperate region)

School type	6 classes	12 classes	18 classes	24 classes
Elementary	1,009 m²	1,852 m²	2,645 m²	3,425 m²
Lower secondary	1,324 m²	2,348 m²	3,340 m²	4,100 m²

Promotion of Eco-schools

●Case of developing a comprehensive project



●Case of other projects

Harmonization with nature

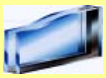
Grass school ground

Energy-/Resource-saving

High efficient lighting
Motion sensor
Daylight sensor

Water-saving toilets

Insulated glass
Double sash



Spray foam insulation

Renewal of deteriorated equipment

Energy-saving ventilators

Energy/CO2 control system

● Eco-School (environmentally-friendly school facilities) Pilot Model Program (April 2012)

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
18 schools	20 schools	20 schools	41 schools	58 schools	88 schools	97 schools	98 schools	101 schools	70 schools	79 schools	104 schools	157 schools	175 schools	134 schools	80 schools	1,340 schools

List of Reports, Cases, Manuals Regarding Measures for Deteriorated Facilities in Recent Years

[Eco-schools]

●On Furthering the Equipping of Environmentally-conscious School Facilities (February 2008): It analyzes current situations and issues concerning the living environment and environment consideration of school facilities. It also recommends environmentally friendly measures that can be taken at the time of refurbishing the existing school facilities by promoting energy-resource-saving efforts, such as the use of thermal water with consideration given to its impact on the environment

●Policy regarding the promotion of environmentally friendly school facilities (eco-schools) - The role of school facilities within a low-carbon society) (Final Report) (March 2009): This report offers a basic philosophy for the promotion of eco-school formation of all facilities, along with specific promotion measures including existing school facilities, in addition to newly built or extended school facilities in order to promote countermeasures to global warming.

●Promoting Environment-focused Renovations of School Buildings: Results of a Simulation of Environmental Measures in Model Plans (August 2009): It presents three model plans in which existing school facilities undergo environmentally friendly refurbishments and improvements, together with earthquake resistance measures, measures for deteriorated facilities, and quality improvements. It also implements verification of effects of the reduction of CO2 emissions, effects of improving the classroom environment in each model plan and estimates of refurbishment costs.

● Aiming for Environmentally-Friendly School Facilities (Eco-Schools) Renovation at Every School - Collection of Case Examples to Make Existing School Facilities More Ecological - (May 2010): It introduces the basic philosophy and procedures for implementing development projects of existing school facilities and presents establishers' and individual schools' efforts for leading eco-schools.

●Promoting Environment-focused Renovations of School Buildings: Results of a Simulation of Environmental Measures in Model Plans (National) (February 2010): In addition to the results of simulations of environmental measures in two regions and three plans, similar verification tests were conducted in four other regions.

●Eco-School: Promoting Environmentally-Friendly Facilities Renovation: Collection of Case Examples of Eco-school Pilot Model Projects (February 2011): It introduces specific cases of eco-school pilot model projects in order to promote environmentally-friendly facilities renovation.

●FAST for Promoting Eco-school [Design tool for considering CO2 emission resection for school facilities] (ver.2) Operation Manual (June 2012): School eco-renovation has become an issue to address global warming. It is a program that instantaneously calculates how much CO2 emissions will be reduced when environmental measures are taken.

[Measures for deteriorated facilities/assessment]

●Ideas for Better Using Our School for A Long Time; Effective Use of Existing School Facilities (March 2005): Collection of ideas aiming for adopting the existing school facilities to the current educational methods/content and better use of the entire school facilities for a longer period of time with flexible use of classrooms for other purposes, etc.

●The role of school facility evaluations - Working towards the improvement of school facilities –(March 2009): Appropriate assessment is deemed necessary in order to solve various issues of school facilities. It presents the objectives of assessment, roles of schools and establishers in assessment, process of assessment, reference examples, such as assessment criteria/indexes, and polices on improvements/support based on assessment results.

●Collection of Case Examples of School Facility Evaluations: Our School Facilities Have Improved This Much (March 2010): Collection of exemplary schools which make efforts for understanding current situations of school facilities and for maintaining and improving facilities on a daily basis in order to promote efforts for school facility assessment.

●CASBEE Schools: Manual for Comprehensive Environment Performance Assessment Method [2010] (September 2010): Manual for comprehensive environment performance assessment for existing buildings or facilities to be newly constructed or renovated based on environmental quality, such as comfortableness of the room and environmental loads, such as greenhouse gas emission.

●Anthology of Ideas for Creating New School Facilities - Achieving Fulfilling Educational Activities and an Enriched School Life - (January 2010): Reference material for solving issues of schools when newly constructing buildings or refurbishing existing facilities.

Procedures for Conversion of Public School Facilities (Asset Disposal Process)

Principle

When converting buildings developed by subsidy ⇒ Pursuant to the provision of the Act for Normalization of Grants, approval of the Minister of Education, Culture, Sports, Science and Technology (**asset disposal process**) is **necessary**.
Since a subsidy is, in principle, provided for the development of public school facilities, it is required to pay an amount equivalent to the subsidy back to the national treasury when the asset is converted to other uses.

However, the asset disposal process is not necessary in the following cases:
- When converting **a building developed without a subsidy**
- When converting the building developed with a subsidy but **the period of restriction on asset disposal has elapsed** (e.g.: Reinforced concrete school building = 47 years)

Drastic simplification/flexibility of the asset disposal process for public school facilities –Efforts of MEXT–

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) is making efforts for drastic simplification/flexibility of the asset disposal process for public school facilities, such as making **payment to the national treasury unnecessary in most cases** for the amount equivalent to the subsidy, as described below:
(Revision of Notice of Treatment in **June 2008**)
◎・・・New Treatment, ☆・・・Expansion of the Scope, ○・・・Existing Treatment

When **10 years have elapsed since the completion of a subsidized project** and in the following cases:

☆Disposing the asset for free (conversion, loan, transfer, demolition) (regardless of who the recipient is)
<Notice may suffice> *(since June 2008)*
- Grant loan/grant transfer for the use of another municipality
- Grant loan/grant transfer to a social welfare corporation, school corporation, private institution, etc.

☆Lending for value or transfer for value regardless of who the recipient is, after depositing the amount equivalent to the subsidy in the fund for the development of school facilities. *(March 2007 (applicable to non-closed schools since June 2008))*

When **10 years have not elapsed** since the completion of a subsidized project and in the following cases:

◎Asset disposal for free, etc. which has undergone earthquake resistance work or large-scale alteration work (limited to asbestos/PCB) *(since June 2008)*

◎Asset disposal for free, etc. which has underdone large-scale alteration work (other than the above) and which have to be disposed of along with the disposal of a building for which 10 years have elapsed since the subsidy *(since June 2008)*

◎Asset disposal for free which has undergone school consolidation due to municipal merger *(since June 2008)*
<Notice may suffice>

○Free conversion/loan of buildings for which a regional revitalization plan has been issued after school consolidation, etc. *(since April 2004)*

Period of Restriction on Asset Disposal

Table of periods of restriction on disposal of assets acquired through a subsidized project

Name of subsidy	Name of asset to which restriction of disposal may apply			Period of restriction on disposal (Year)	
	Name of establisher, etc.	Name asset	Structural specifications, etc.	(1)	(2)
Subsidy for improving public school facilities, etc.	Public educational facility	School building	Steel reinforced concrete	60	47
		Indoor sports arena Dormitory Teachers' dormitory	Built of brick, block, stone	45	38
			Steel frame	40	34
			Built of wood	24	22
		Swimming pool		30	30
		Air-conditioner	Output of refrigerator is 22kw or lower	13	13
			Other	15	15
		Boiler		15	15
		Elevator		17	17

(1) Applies to the assets acquired or whose utility has been increased through the subsidized projects implemented prior to the FY2000 budget pursuant to Notice No. 28 of the Ministry of Education, Culture, Sports, Science and Technology, issued on March 5, 1985
(2) Applies to the assets acquired or whose utility has been increased through the subsidized projects implemented after the FY2001 budget pursuant to Notice No. 53 of the Ministry of Education, Culture, Sports, Science and Technology, issued on March 25, 2002

Project for the future use of " Closed Down School to be used by the Community"

(since September 2010)

Issues involved in the use of closed school facilities, etc.

・Although the use of closed school facilities, etc. is being considered a new user can not be found (municipalities)
・Although there is a demand for closed school facilities, etc. for business purposes, suitable closed facilities, etc. can not be found (entity needing the facility)

Solution

Matching information on closed school facilities, etc. and application needs

Municipality

Information on closed facilities, etc.
・Year of construction
・Area
・Location
・Lease/transfer conditions
・Contact information, etc.

Consultation/Application

Matching

Information provision, public offering of individual closed schools, etc.

Entity needing facility

・Private company
・NPO
・Nursery center
・Child welfare facility
・Nursing home, etc.

Collection of scattered information on closed schools, etc.

MEXT

Information of closed schools on the Website
= List of closed school facilities available for use

Comprehensive provision of updated information on public offering of closed schools throughout Japan

○Posting closed schools of municipalities throughout Japan on the MEXT website will provide persons wishing to use such facilities with necessary information, which will give them more options, and as a result, the use of such facilities in line with the local conditions will be realized. (Municipalities)
○By getting comprehensive information on closed schools throughout Japan, it is possible to consider the use of school facilities with better and suitable conditions. (Entity needing the facility)

●Examples of school facilities diverted to other use through "Closed School for Everyone" project

Prefecture	Name of establisher	Former school name	Facility after diversion
Hokkaido	Yubari city	Konan Elementary School	Company storage (leasing company)
Hokkaido	Niikappu town	Biu Elementary School	Training/exchange facility
Ibaraki	Tone town	Tone Lower Secondary School, Fukawa Elementary School	Four-year college

Prefecture	Name of establisher	Former school name	Facility after diversion
Nagano	Fujimi town	Minami Lower Secondary School	Factory
Miyazaki	Miyazaki city	Sarukawa Elementary School	Experiential exchange facility
Miyazaki	Miyakonojo city	Shika Elementary School	Research facility

Examples of Use of Closed Schools

Major usage / Example		Year 2010	2011
Citizen's public hall, Resource center, etc.			**754**
Social education facility	Citizen's public hall, life-long learning center, etc.	594	**608**
Cultural facility	Resource center, art museum, etc.	131	**146**
Social physical education facility			**802**
Social physical education facility	Sports center, etc.	707	**802**
Welfare facility, Medical facility, etc.			**337**
Welfare facility for people with disabilities	Self-reliance support facility, workshop, etc.	64	**73**
Nursery center		32	**35**
Children's welfare facility (excluding nursery center)	Families' Children Support Center, etc.	31	**33**
Clubs for after school activities for children		31	**40**
After school lessons for children		20	**18**
Day service center for the elderly		31	**36**
Facilities Covered by Public Aid Providing Long-Term Care to the Elderly (Special nursing home)		22	**28**
Other welfare facility for the elderly	Small-scale multi-functional home, Inter-generation exchange center, etc.	58	**60**
Medical facility		14	**14**
Experiential exchange facility, etc.			**300**
Experiential exchange facility	Nature experience facility, Agricultural experience facility, etc.	156	**179**
Research facility		78	**90**
Accommodation facility (accommodation facility excluding experiential exchange facility)		25	**31**
Government office			**291**
Government office		194	**210**
Stockpile warehouse		64	**81**
Facility for supporting the establishment of a new business enterprise, facility of other juridical persons			**181**
Corporate facility	Plant, office, etc.	91	**122**
Facility for supporting the establishment of a new business enterprise	Base facility for venture capitals	18	**22**
Office, etc. of other juridical persons (excluding corporations and school juridical persons)		31	**37**
Housing			**32**
Housing		27	**32**
University facility			**25**
University facility		24	**25**

(Multiple answers accepted)

●Odate city, Akita Prefecture
Former Yamada Elementary School
(Uncured ham factory)

●Setagaya-ku, Tokyo
Former Ikejiri Lower Secondary School
(Craftsmanship School)

●Yamazoe village, Nara Prefecture
Former Kitano Elementary School
(Nursery center)

Use of Spare Classrooms (as of May 1, 2009)

1. Use of spare classrooms

(Unit: room)

*Upper section indicates the percentage of the number of spare classrooms (number of used classrooms, used for other purposes than school facility, number of unused classrooms) (unit:%)

School Classification	Spare classroom (1)	Used classroom (2)	Used as school facility	Used for other purposes than school facility	Social education facility, etc.	Stockpile storage	Welfare facility for children		After-school classes for children	Social welfare facility	Other (including closed schools)	Number of unused classrooms	With plan for use	Without plan for use
							Nursery center	Children's center, etc.						
Elementary School	100%	99.0%										1.0%		
		100%	92.0%	8.0%								100%	67.0%	33.0%
				100%	8.4%	8.8%	1.2%	2.8%	65.5%	4.4%	8.8%			
	40,209	39,827	36,658	3,169	266	280	39	90	2,076	139	279	382	256	126
Lower Secondary School	100%	99.2%										0.8%		
		100%	98.7%	1.3%								100%	76.9%	23.1%
				100%	31.1%	23.6%	1.5%	0.0%	1.5%	6.7%	35.6%			
	20,893	20,720	20,453	267	83	63	4	0	4	18	95	173	133	40
Total	100%	99.1%										0.9%		
		100%	94.3%	5.7%								100%	70.1%	29.9%
				100%	10.2%	10.0%	1.3%	2.6%	60.5%	4.6%	10.9%			
	61,102	60,547	57,111	3,436	349	343	43	90	2,080	157	374	555	389	166

2. Breakdown of use as school facility

(Unit: room)

School Classification	Used as school facility	Space for children and students	Space responding to diversification of learning and teaching methods	Learning space, such as special classroom, etc.	School life/exchange space for children and students	Counseling room for mental health	Space for lesson preparation	Other space	Space for teachers	Space for supporting schools open to the community	Stockpile storage for school, etc.
Elementary School	36,658	32,445	15,707	9,255	4,889	813	1,781	4,213	2,155	1,106	952
Lower Secondary School	20,453	18,204	8,882	4,471	2,647	1,167	1,037	2,249	1,436	330	483
Total	57,111	50,649	24,589	13,726	7,536	1,980	2,818	6,462	3,591	1,436	1,435

Number of Schools Designated as an Evacuation Facility

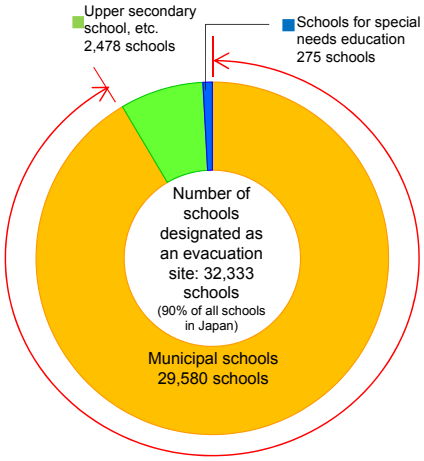
About 90% of public schools are designated as evacuation facility

Number of schools designated as evacuation facility

Classification		Total number of schools (schools)	Number of schools designated as an evacuation facility	Rate (%)
Municipal school		31,642 29,675 (29,995)	29,580 27,822 (27,997)	93.5 93.8 (93.3)
Prefectural school	Upper secondary school, etc.	3,578 3,338 (3,385)	2,478 2,348 (2,286)	69.3 70.3 (67.5)
	Schools for special needs education	868 813 (805)	275 268 (230)	31.7 33.0 (28.6)
Total		36,088 33,826 (34,185)	32,333 30,438 (30,513)	89.6 90.0 (89.3)

- Figures at the top indicate the national figures as of May 1, 2012
- Figures in the middle and in the brackets indicate figures as of May 1, 2012, excluding Iwate, Miyagi, and Fukushima prefectures

Of school facilities designated as an evacuation facility, about 90% are municipal schools



* Survey on Disaster Prevention Functions of School Facilities (Educational Facilities Research Center, National Institute for Educational Policy Research)
* As of May 1, 2012

○ The National Institute for Educational Policy Research conducted a survey on the disaster prevention functions of public schools (excluding Iwate, Miyagi and Fukushima Prefectures).

Preparation of Disaster-Prevention Facilities and Equipment of School Facilities Designated as Evacuation Centers

Although 89.6% of public schools are designated as evacuation sites, the designated schools do not necessarily have all of the functions required for a designated evacuation site.

Preparation of disaster-prevention facilities and equipment of school facilities designated as evacuation centers

Item	Municipal schools			Prefectural schools						Total		
				Upper secondary schools			Schools for special needs education					
	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)	No. of school designated as evacuation centers (schools)	No. installed (schools)	Percentage (%)
Disaster prevention and storage warehouses (within the school grounds)		11,731	39.7		599	24.2		84	30.5		12,414	38.4 (35.2)
Disaster prevention and storage warehouses (including those outside the school grounds)		14,392	48.7		639	25.8		86	31.3		15,117	46.8 –
Toilets that can be accessed from outside the building		19,793	66.9		1,887	76.2		150	54.5		21,830	67.5 (65.7)
Toilets in gymnasiums		23,941	80.9		1,676	67.6		193	70.2		25,810	79.8 (78.0)
Multipurpose toilets in gymnasiums		5,660	19.1		433	17.5		101	36.7		6,194	19.2 –
Multipurpose toilets in school buildings		12,193	41.2		1,291	52.1		203	73.8		13,687	42.3 –
Communication devices	29,580	12,327	41.7	2,478	532	21.5	275	71	25.8	32,333	12,930	40.0 (30.2)
In-house power generation systems, etc. *		7,830	26.5		863	34.8		206	74.9		8,899	27.5 (18.0)
Water purification devices for water tanks and pools, wells		9,888	33.4		852	34.4		98	35.6		10,838	33.5 (29.7)
Spaces for those in need of special help		10,216	34.5		1,163	46.9		140	50.9		11,519	35.6 –
Spaces considering privacy for women		9,836	33.3		1,041	42.0		123	44.7		11,000	34.0 –
Wheelchair ramps in gymnasiums		12,753	43.1		911	36.8		170	61.8		13,834	42.8 –
Wheelchair ramps in school buildings		14,489	49.0		1,412	57.0		201	73.1		16,102	49.8 –

* Survey on Disaster Prevention Functions of School Facilities
(Educational Facilities Research Center, National Institute for Educational Policy Research)
* As of May 1, 2012

(Reference 1) Target Durable Lifetime of a Building

●Desirable target durable lifetime grade of an entire structure

Usage	Steel reinforced concrete	
	High quality	Regular quality
School	Over Y.100	Over Y.60

●Example of the grade of target durable lifetime of a building

Grade	Representative value	Range
Y.100	100 years	80–120
Y.60	60 years	50–80

<Source> *Practical Guide for Service Life Planning of Buildings*, edited and published by Architectural Institute of Japan (October, 1988)

(Reference 2) Years until Planned Renewal for Building Parts and Materials

Classification	Type	Name	Years until planned renewal (years)*
Roof	Exposed waterproofing	Roof, asphalt exposed waterproofing	20
Exterior	Finishing paint for exterior wall	Exterior wall, finishing paint for multiple layers	15
Finishing interior	Wall-board	Inside wall, gypsum board covering	30
Fitting	Exterior aluminum fitting	External fitting, double sliding window made of aluminum	40
Electric power	Fluorescent light	Lighting equipment, fluorescent light, built-in/open downward FHF, 32W×2	20
	Panel board	Panel board (master 3P 224A , branch 18 circuits)	25
Communication /information	Loud speaker	Speaker, built-in type	20
Water supply & drainage	Water and hot water supply pipe/ pipes	Vinyl pipes (HIVP, water supply) 30A	20
	Equipment: tanks	Copperplate hot-water tank	20
Ventilation	Ventilation equipment: fan	Fan equipped with silencer box	20

* Years until planned renewal: Indicating years necessary for planned renewal, calculated based on surveys of building materials associations/equipment manufacturers

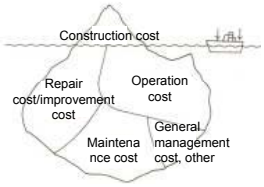
[Source] *Life-cycle Costs of Building Materials FY2005 version*, supervised by Government Buildings Department, Ministry of Land, Infrastructure, Transport and Tourism, edited/published by Building Maintenance & Management Center, published by Economic Research Association (September 2005)

(Reference 3) Life-cycle Cost

Running costs, which include maintenance cost, repair cost, improvement cost and management cost (including utilities) accrued during the operation and management phase, account for a large portion of life-cycle costs (LCC)* and in some cases, they can reach 4–5 times the initial construction cost.

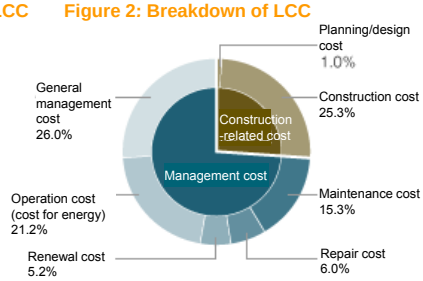
*LLC (life-cycle cost): Sum of all costs over the full life span of a building: including the planning and design phase, construction phase, operation and management phase and demolition and recycling phase.

Figure 1: Concept of building LCC



Looking at the component of building LCC, construction cost is only the tip of the iceberg

Figure 2: Breakdown of LCC



*Office building with 8 floors above ground and 1 floor underground, total floor area of 4,000 m²

Figure 3: Example of Changes in LCC over the years

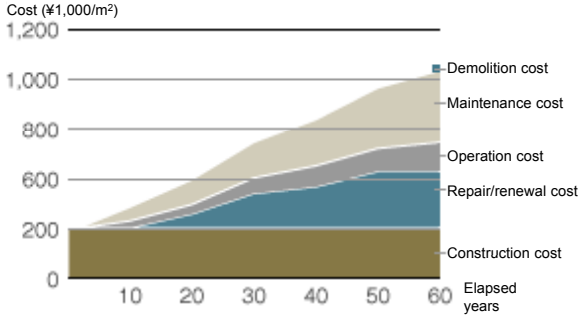


Table 1: LCC model of medium size office building (for 65 years)

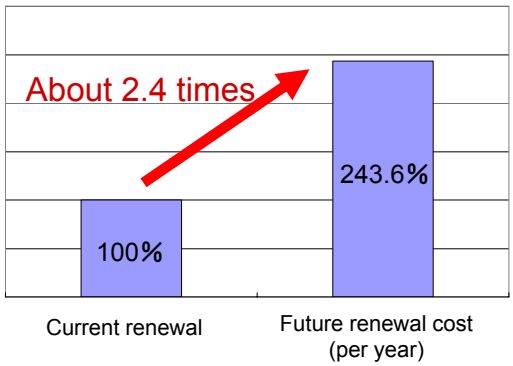
Large category	Subcategory	Cost (¥1,000)	Occupancy (%)	
Planning and design cost	Construction plan cost	3,328	0.1%	
	On-site study cost	3,092	0.1%	
	Land acquisition cost	2,017	0.1%	
	Design cost	43,904	1.2%	
	Impact analysis cost	728		
	Environment management cost	728		
	Design support cost	2,887		Construction cost accounts for around 1/4
	(Sub total)	56,684	1.6%	
Construction cost	Construction contract cost	1,109		
	Construction work cost	918,634	25.1%	
	Work management cost	14,931	0.4%	
	Construction inspection cost	754		
	Environmental measures cost	967		
	Construction support cost	4,268	0.1%	
	(Sub total)	940,663	25.7%	
Operation and management cost	Maintenance cost	794,710	21.7%	
	Repair cost	869,545	23.8%	
	Improvement cost	78,351	2.1%	Maintenance/ operation and management cost accounts for around 3/4
	Operation cost	483,538	13.2%	
	General management cost	187,226	5.1%	
	Operation support cost	187,226	5.1%	
	(Sub total)	2,600,596	71.1%	
Demolition and recycling cost	Demolition cost	38,498	1.1%	
	Recycling cost	19,928	0.5%	
	Environmental measures cost	322		
	(Sub total)	58,748	1.6%	
Total		3,656,691	100.0%	

(Source) Figure 1, Table 1: *Building Life-cycle Cost* , Supervised by the Government Buildings Department, Ministry of Land, Infrastructure, Transport and Tourism
Figure 2, Figure 3: *Building LC Business Encyclopedia* edited by Building and Equipment Long-Life Cycle Association

(Reference 4) Estimates of Cost of Renewing Public Facilities and Facilities with Concerns about Increasing demand for Renewal

The cost of renewing pubic facilities in the future is estimated to be 2.4 times today's amount.
About 65% of all municipalities are concerned about the increasing demand to renew school facilities.

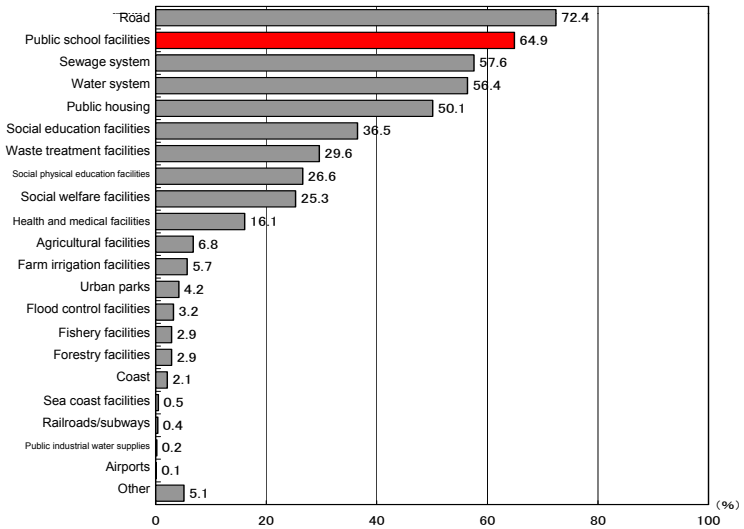
●Rate of renewal cost/year in the future against current renewal cost: Public facilities (schools, public housing)



* "Survey on Comparative Analysis of Future Renewal Cost of Public Facilities and Infrastructure," Ministry of Internal Affairs and Communications, March 2012

* Assuming that public facilities (schools, public housing) owned by municipalities will be renewed with the same area/extension as today after the elapse of intended lifespan since the construction/development, the cost of renewal is estimated at 40 fiscal years following the fiscal year of estimation. (Assuming that public facilities shall undergo large-scale alteration after 30 years and reconstruction after 60 years) (Respondents: 111 municipalities)

●Facilities with concerns about increasing maintenance/renewal demand for infrastructure in the future



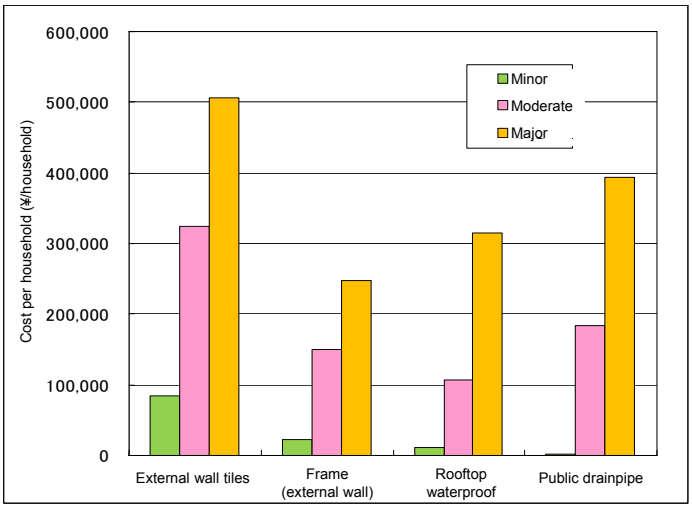
* "Survey on Maintenance and Renewal of Infrastructure" Ministry of Internal Affairs and Communications, February 2012

* Survey was conducted by the self-enumeration method (respondents filled in the survey form) on 1,750 municipalities (as of August 31, 2010) (No. of respondents: 1,381 municipalities)

(Reference 5) Cost Comparison between Preventive Maintenance and Corrective Maintenance (Example)

As deterioration progresses, the repair cost increases due to the higher cost of applied technology and expanded scope of repairs.

(Reference) Rough estimate of the cost of repairs using technology according the degree of deterioration (case of residential complex)*



Applied technology and scope of repairs corresponding to the graph

Section	Degree of deterioration	Applied technology	Scope of repairs
External wall tiles	Minor	Replacement (part)	5% of the entire wall
	Moderate	Replacement (part)	20% of the entire wall
	Major	Replacement (part)	30% of the entire wall
Frame (external wall)	Minor	Repair of cracks (coating/filling)	Very small part
	Moderate	Surface treatment (carbonation suppression) +Patch repair (reinforced corrosion repair)	Limited scope
	Major	Surface treatment (carbonation suppression) +Patch repair (reinforced corrosion repair)	Large scope
Rooftop waterproof	Minor	Cover method (exposed waterproof)	Partial
	Moderate	Cover method (exposed waterproof)	Entire
	Major	Asphalt exposed waterproof (Re-application of new waterproof layer after removing the entire existing waterproof layer)	Entire
Public drainpipe	Minor	High-pressure washing of drainpipes	Set
	Moderate	Drainpipe regeneration (Regeneration of miscellaneous waste water pipes by reversal insertion)	Set
	Major	General renewal of drainpipes	Set

* Excerpt form "Document 2-5 Technologies (durability and lifetime) for Revival of Residential Complex, 2. Application of repair/ refurbishment technologies in accordance with the degree of deterioration, (5) Comparison of repair cost in accordance with the degree of deterioration, of the Study Group for Revival of Existing Residential Stock in Sustainable Society (3rd meeting) [Held on May 16, 2012), Ministry of Infrastructure, Land, Transport and Tourism

(Reference 6) Amount of Waste Materials form Reconstruction and Refurbishment Work

Construction waste will be reduced by 1/10 by shifting from reconstruction to major refurbishment (for the lifespan extension of school facilities)

The floor area in which construction waste materials are the same among demolition, new construction and refurbishment

Demolition	Floor area	80㎡
New construction	Floor area	500㎡
Repair/ remodeling	Amount	¥100 million

Article 2 of the Enforcement Ordinance of the Construction Material Recycling Act (Construction Recycling Act) (Ordinance No. 495, 2010)

Estimation of the amount of generated waste

		Area (㎡) ①	Standard size *1 (㎡) ②	Amount of generated waste (index) ②/①
Reconstruction	Demolition	80	5,200	65.0
	New construction	500	5,200	10.4
	Total	—	—	75.4
Major refurbishment work		667 *2	5,200	7.8

About 1/10

*1 Average of retention area of public elementary schools and lower secondary schools in Japan (Survey on Public School Facilities: FY 2011)
*2 Estimated with major refurbishment work = ¥150,000/m²

(Reference 7) Relationship between Retention Area and Repair Cost (Estimates)

National average of repair cost is about ¥6 million/m².
If there is a spare area of 10% for example, the cost of repair of the relevant section for an establisher drops to about ¥4.5 million/year assuming all other factors remain unchanged. level.

Repair cost of elementary and lower secondary schools (national average)

Annual cost of repair (¥1 million)	Total area (1,000 m²)	Square-meter unit (annual ¥/m²)
99,000	163,000	607

Composition of repair cost: Re-painting, repair of roofs and windows, repair of equipment, etc.

Repair cost: Report on the Survey on the Cost of Municipal Education of 2010 (FY2009)
Area: Survey on Public School Facilities of 2009

(Reference)

Annual cost of repair (estimates) per school of the relevant section assuming that the spare area is set at 10% of the area of school buildings

Square-meter unit (annual ¥/m²)	Spare area (m²)	Annual cost of repair (¥1,000)
607	420	255

Spare area: Calculated from the average area of school buildings (4,200 m²) cited in the Survey of Public Facilities of FY2009

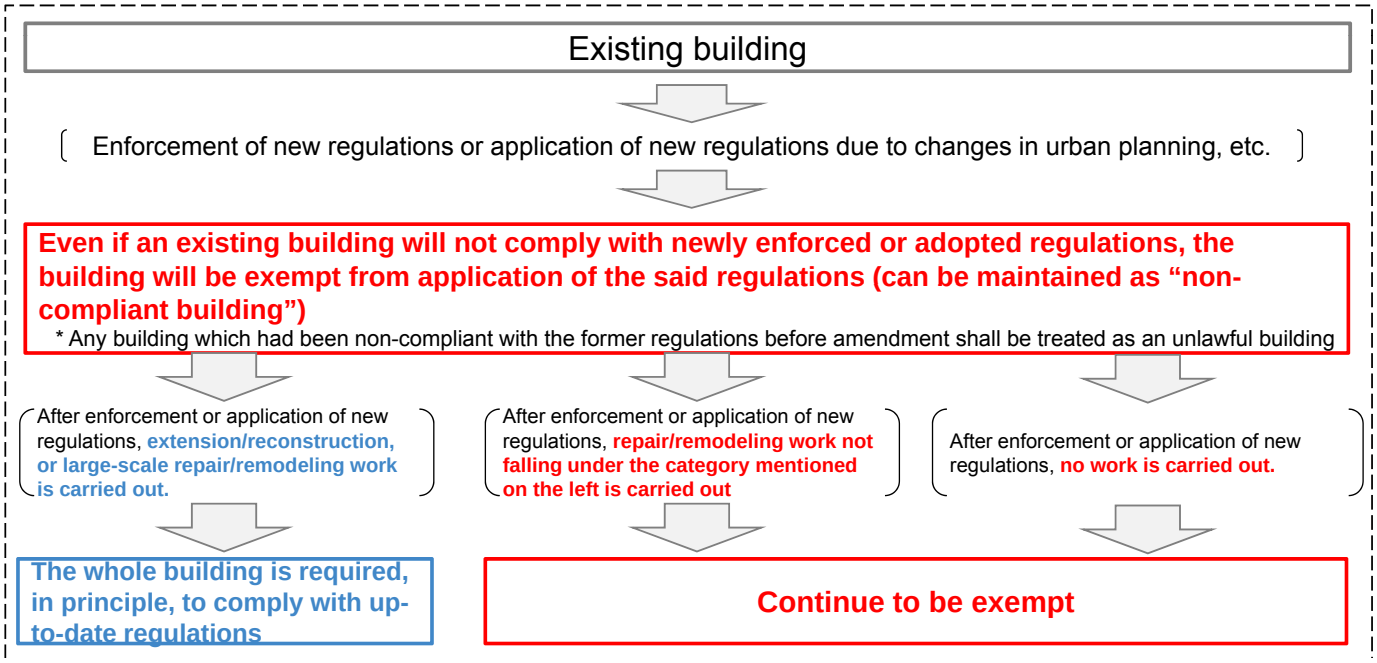
When converted to the amount per establisher = about ¥4.5 million/year

Calculated using 1,800 establishers and 32,043 elementary and lower secondary schools in Japan as of May 1, 2009

(Reference 8-1)Existing Non-compliant Buildings (MLIT document)

Existing Non-compliant Building
To prevent existing lawful buildings from becoming unlawful upon an amendment to the laws, when enforcing new regulations or adopting new regulations due to changes in urban planning, etc., buildings existing or under construction that may not conform to newly enforced or adopted regulations shall be exempt from application of regulations, and such buildings shall, in principle, be made in conformity to the said regulations at the time of extension or reconstruction, etc.

<Application of regulations concerning existing non-compliant buildings>



(Reference 8-2) Deregulation Measures Concerning Extension/Reconstruction and Large-scale Repair/Remodeling of Existing Non-compliant Buildings (MLIT Document)

Under the Building Standards Act, when conducting extension/reconstruction work on existing non-compliant buildings, the existing section is, in principle, required to comply with up-to-date standards. However, the following extension/reconstruction work on the existing section shall be eligible for lenient application of the regulations. The more lenient the application of the current standards for the existing section is when extension/reconstruction, etc. work is carried out, the smoother the effective use of the stock becomes through refurbishment work; however, the improvement of performance of the existing section will be postponed.

Article 3, Article 86(7) of the Building Standards Act

[Scope of lenient application of up-to-date standards to the existing section]

	Extension		Reconstruction		Large-scale repair/ remodeling
Structural regulation	In cases where extension work is done in which parts are joined by such a structural method that does not transfer stress to each other, such as expansion joint.	In cases of extension in an integrated manner	In cases where reconstruction work is done in which parts are joined by such a structural method that does not transfer stress to each other, such as expansion joint	In cases of reconstruction in an integrated manner	All (When risks will not become greater)
	Extension of less than 1/2 of the existing part (The existing section must comply with the standards for seismic evaluation (including new standards)	Extension of less than 1/2 of the existing part (Required to confirm the structural safety of the entire building in structural calculation)	Reconstruction of less than 1/2 of the existing part (The existing section must comply with the standards for seismic evaluation, including new standards)	Reconstruction of less than 1/2 of the existing part (Required to confirm the structural safety of the entire building in structural calculation)	
Fire prevention/ evacuation regulation	Less than 50 m² (Articles 26 & 27) (Other cases are in principle the same as new construction)		Less than 50 m² (Articles 26 & 27) (Other cases are in principle the same as new construction)		All (Articles 26 & 27) (Other cases are in principle the same as new construction)
Hygiene regulation	All (When the space to be extended is in compliance with up-to-date standards)		All (When the space to be reconstructed is in compliance with up-to-date standards)		All (When the space to be largely repaired/remodeled is in compliance with up-to-date standards)
Usage regulation	Extension of less than 1/5 of the existing part (Required not to change the use)		All (Required not to change the use)		All (Required not to change the use)
Volume regulation	Less than 1/5 of extension of the existing part in the case of garage, etc.		Less than 1/5 of reconstruction of the existing part in the case of garage, etc.		All

(Reference 8-3) Interpretation of Extension/Reconstruction under the Building Standards Act (MLIT Document)

Extension

To increase total floor area (adding floor area) of an existing building on the site

Reconstruction

After part or all of a building is removed or destroyed due to a disaster, etc., a building with similar use, size and structure is to be built, and any work that does not fall into the category of extension or large-scale repair, etc. is to be done.

Large-scale repair

Repair work on the majority of more than one part of the main structural section* of a building (Article 2-(14))

“Repair” refers to work on part of an existing building using largely a similar shape, size and materials.

Large-scale remodeling

Remodeling work on the majority of more than one part of the main structural section* of a building (Article 2-(15))

“Remodeling” refers to work on part of an existing building using a largely similar shape and size but different materials and structural type, etc.

*Main structural section (Article 2(5) of the Act) refers to walls, pillars, floors, beams, roofs and staircases, excluding structurally unimportant parts of a building, such as partition walls, decoration pillars, raised seedbed, floor of the bottom floor, floors of a revolving stage, minor beams, eaves, small staircases in a limited area, external stairs, and any other similar items.

Reference: Detailed Explanation of the Building Standards Act (supervised by Housing Bureau, Ministry of Construction, edited by the Building Center of Japan)

Estimates of Future Renewal Cost of Public Elementary and Lower Secondary Schools (1)

Condition used for estimates

I. Target of estimates

- Non-wooden school buildings, indoor sports facilities and dormitories of public elementary and lower secondary schools

II. In the case where no major refurbishment is carried out

1.Existing stock

- Retention area is calculated based on the Survey on Public School Facilities
- Among the area of buildings built over 20 years ago, 10% are refurbished, 40% are partially refurbished and 50% are not refurbished (Reference: Survey on Public School Facilities)
- Retention area has declined by 15% in 30 years. (According to the School Basic Survey, the number of elementary and lower secondary schools declined by about 10% in the 20 years since FY1991. FY1991 = 35,152 schools FY2010 = 31,346 schools)

2.Timing of refurbishment/reconstruction

- All buildings reconstructed at 50 years of age
- 60% undergo large-scale refurbishment (full-scale) and 40% partial refurbishment at 25 years old (Reference: Survey on Pubic School Facilities)

(
- Buildings over 51 years old will be equally reconstructed in the next five years
- Buildings between 41 and 50 years old which have not undergone refurbishment (including partial refurbishment) will not undergo large-scale refurbishment since timing of reconstruction is near.
- Buildings between 31 and 40 years old which have not undergone refurbishment will equally undergo partial refurbishment in the next 10 years.
- Buildings between 21 and 30 years old which have not undergone refurbishment (including partial refurbishment) will undergo refurbishment based on the previous record of refurbishment.
)

3. Unit cost

Unit cost of refurbishment and reconstruction: Reconstruction ¥250,000/m², Large-scale refurbishment (full-scale) ¥120,000/m², Partial refurbishment ¥60,000/m²

III. When implementing major refurbishment (points different from II.)

1.Timing of refurbishment and reconstruction

- 20% of buildings have undergone reconstruction at 50 years old and 80% have undergone major refurbishment. Buildings that have undergone major refurbishment are reconstructed at 75 years of old.

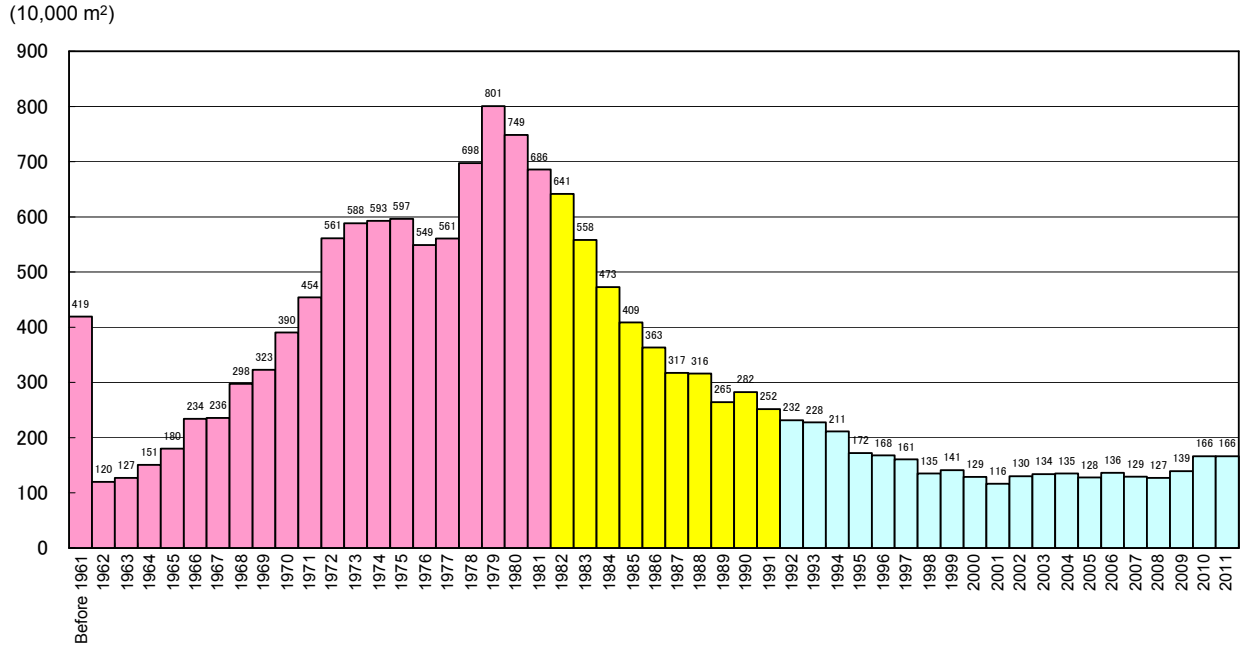
(
- Buildings over 51 years old will not undergo major refurbishment.
)

2. Unit cost

- Unit cost of major refurbishment is 60% of the unit cost of reconstruction.

Estimates of Future Renewal Cost of Public Elementary and Lower Secondary Schools (2)

Retention area of non-wooden buildings of public elementary and lower secondary schools by construction year

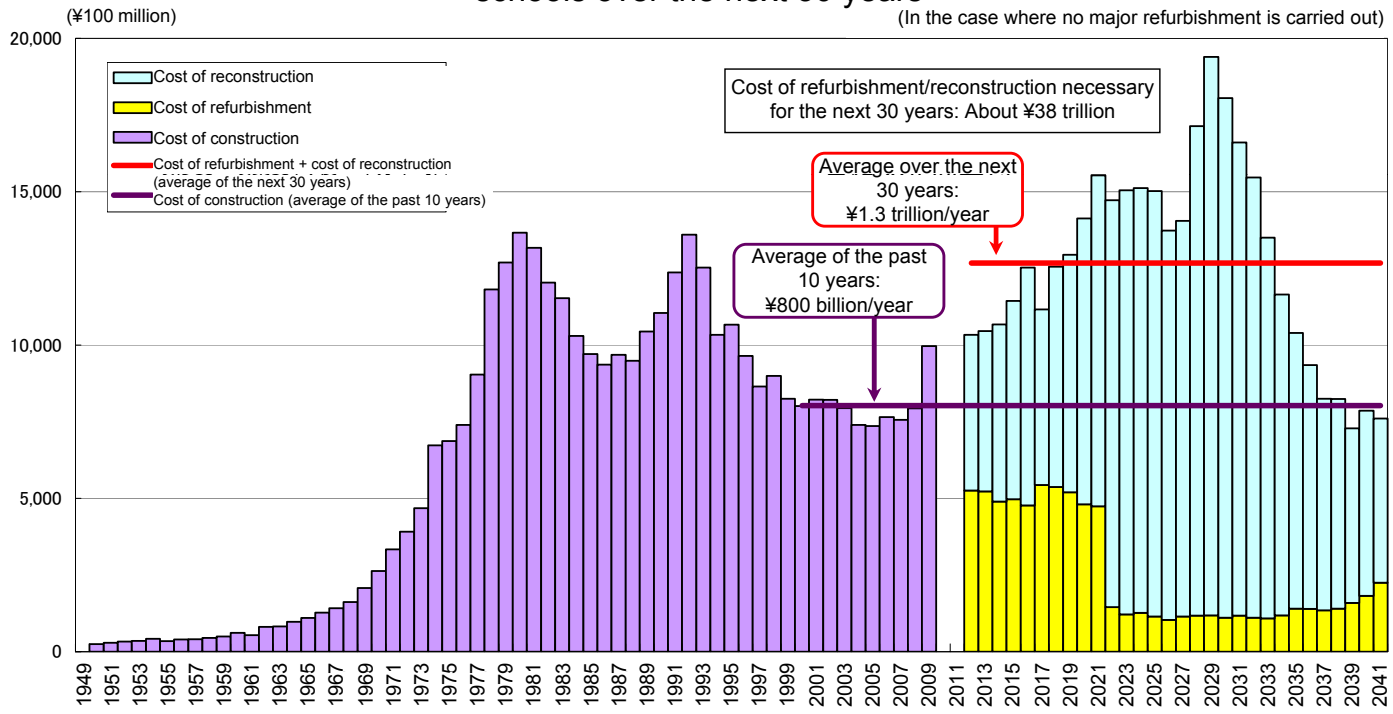


Years elapsed	Over 50 years	45-49 years	40-44 years	35-39 years	30-34 years	25-29 years	20-24 years	15-19 years	10-14 years	5-9 years	0-4 years
Year of construction	Before 1961	1962-1966	1967-1971	1972-1976	1977-1981	1982-1986	1987-1991	1992-1996	1997-2001	2002-2006	2007-2011

*Prepared based on the Survey of Public School Facilities

Estimates of Future Renewal Cost of Public Elementary and Lower Secondary Schools (3)

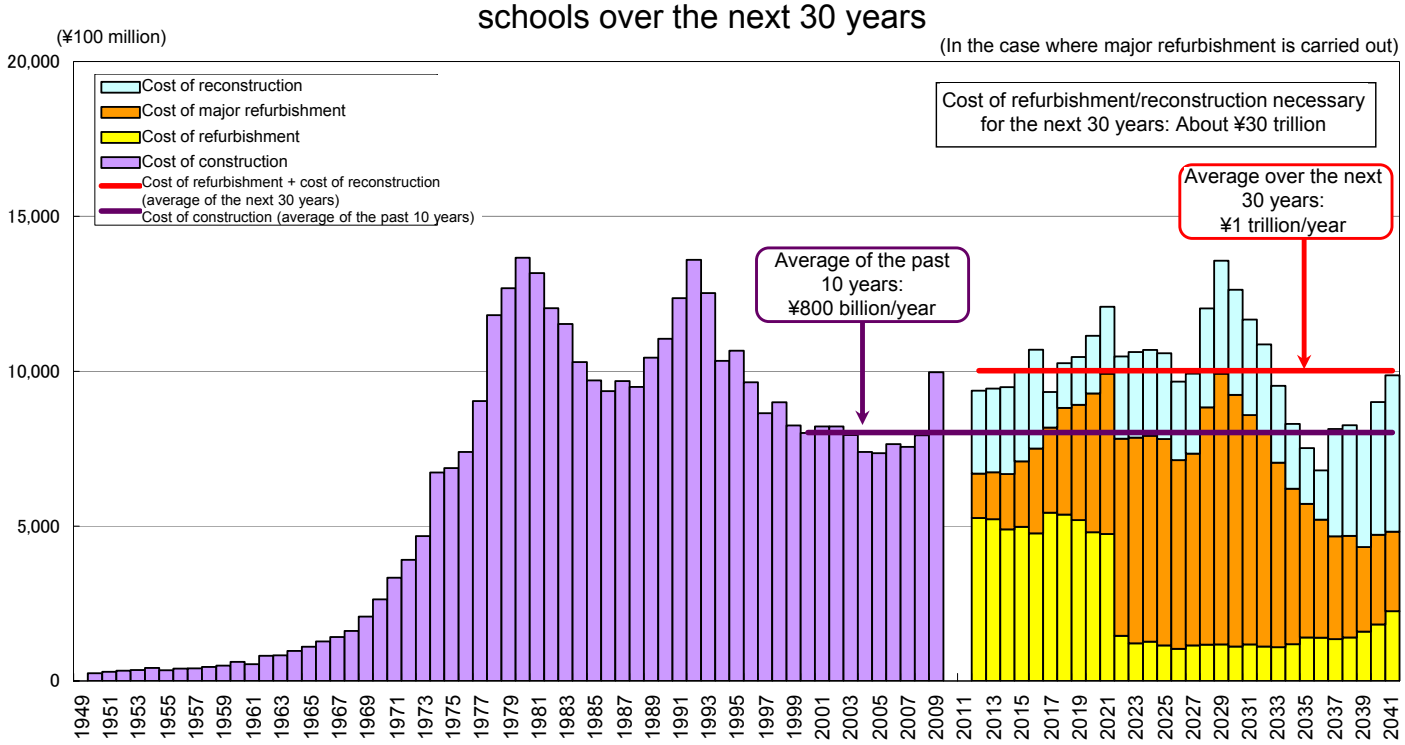
Cost of refurbishment/reconstruction of public elementary and lower secondary schools over the next 30 years



*Figures before 2009 are from the Survey on Local Educational Expenditure
Figures after 2012 are prepared based on the Survey on Public School Facilities and the School Basic Survey, etc.

Estimates of Future Renewal Cost of Public Elementary and Lower Secondary Schools (4)

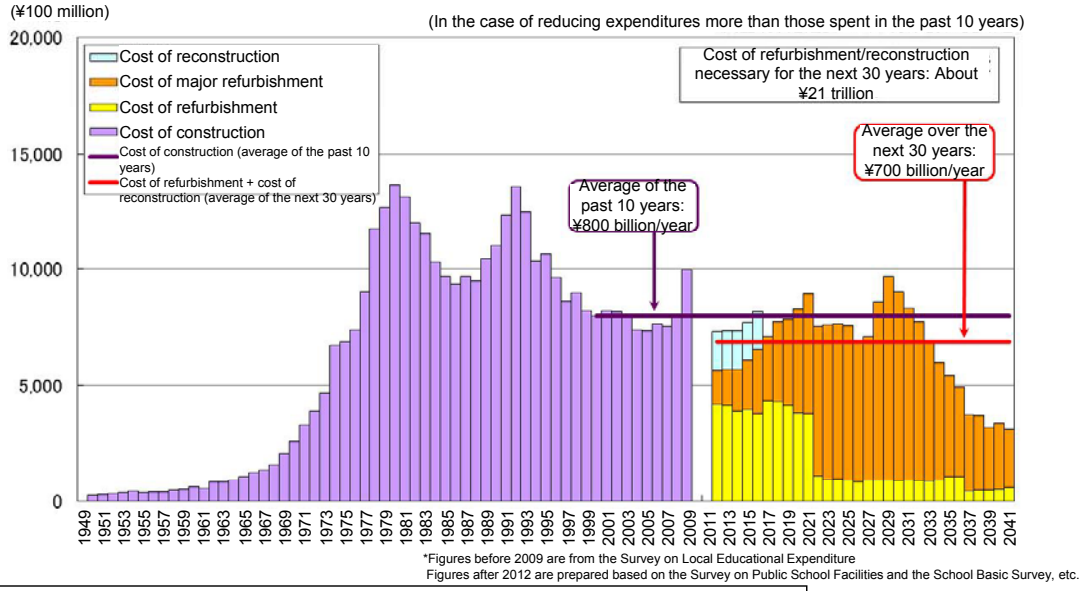
Cost of refurbishment/reconstruction of public elementary and lower secondary schools over the next 30 years



*Figures before 2009 are from the Survey on Local Educational Expenditure
Figures after 2012 are prepared based on the Survey on Public School Facilities and the School Basic Survey, etc.

Estimates of Future Renewal Cost of Public Elementary and Lower Secondary Schools (5)

Cost of refurbishment/reconstruction of public elementary and lower secondary schools over the next 30 years



*Figures before 2009 are from the Survey on Local Educational Expenditure
Figures after 2012 are prepared based on the Survey on Public School Facilities and the School Basic Survey, etc.

Conditions leading to this result [points different from (P103 “Conditions used for estimates II”)]

1. Existing stock
   - Reduction of retention area by about 35% in 30 years (using estimated population reduction (National Institute of Population and Social Security Research))
2. Timing of refurbishment/reconstruction
   - All buildings undergo major refurbishment at 50 years of age, and are then reconstructed at 80 years of age.

   (• No major refurbishment is carried out for buildings over 51 years of age)
3. Unit cost
   - Unit cost for reconstruction/refurbishment is 80% of (P103 “Conditions used for estimates II”). Unit cost of major refurbishment is 60% of unit cost of reconstruction.

Project on Major Refurbishment (FY2013 Budget)

[Outline]
In order to renew old facilities that had been reconstructed in the past, the durability of buildings will be improved through lifespan extension of structures and renewal of lifelines, etc. and support will be offered to meet the social needs of today, such as provision of an environment that enables energy-saving and activities of diverse learning content and styles.

[Target schools] Kindergartens, elementary, lower secondary schools, secondary education schools (1st term), schools for special needs education

[Target buildings] School buildings, indoor sports facilities, dormitories

[Subsidy ratio] 1/3 *** In addition, local financial measures similar to the case of reconstruction (plan)**

[Subsidy requirements] Buildings with lower than average scores of strength evaluation
Lower limit: ¥70 million (small schools: ¥10 million, kindergartens: ¥4 million)

Case of Improvement
◆Improvement of the durability of a building
・Implement lifespan extension measures for structures (Anti-carbonation concrete protection and anti-corrosion for reinforced concrete structures, etc.)
・Use of highly durable materials, etc. (Use of paint/water proof materials, etc. with increased strength against deterioration)
・Ensure ease of maintenance and facility renewal
・Renewal of lifelines, such as water service, electricity, and gas pipes, etc.
◆Meeting social needs of today
・Provision of an environment that enables activities of diverse learning content and styles, such as small-group teaching
・Energy saving measures, such as insulation, double sash and solar shading

Effects of lifespan extension

・Currently buildings are reconstructed after about 40 years. Technically, a building can be used for 70–80 years by conducting higher grade improvements than regular refurbishment.
・Cost is lower than reconstruction with less amount of generated waste.

Comparison between reconstruction and major refurbishment (estimates): elementary school building of reinforced concrete (12 classrooms)

	Reconstruction work	Project on Major Refurbishment
Cost	Unit cost of construction (approx.**¥150,000/m²**) × Area (4,000 m²) = approx. ¥600 million Subsidy ratio 1/3 (Subsidy of about ¥200 million, **local contributions of about ¥400 million*1**) *1 Among the local contributions, ¥240 million is covered by local tax allocation measures for redemption money for principal and interest as local financial measures (FY 2012)	Unit cost of major refurbishment (approx. **¥90,000*2/m²**) × Area (4,000 m²) = **approx.¥360 million** Subsidy ratio 1/3 (Subsidy of about ¥120 million, **local contributions of about ¥240 million*3**) *2 Unit cost of major refurbishment is estimated to be 60% of unit cost of reconstruction *3 Similar local financial measures as those at the time of reconstruction (plan)
Work	Reconstruction of buildings	Refurbished to become a facility meeting the social needs of today with improved durability

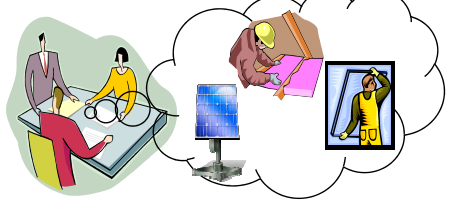
Leading Project of Countermeasures against Deterioration of School Facility (FY2013 Budget Amount: ¥6,708,000))

(1) 100 Year School Model (refurbishment model aiming for 100 years of durability)
(2) Excellent Renewal Refurbishment Model (refurbishment model being suitable for diverse learning methods, etc., as well as meeting the social needs of today, such as energy saving)
(3) Creation of Complexes/Downsizing School Building Premises Model (refurbishment model through measures such as the creation of complexes with other public facilities or the downsizing school building premises)

→ ***In principle, select one project for each of (1) – (3)***

Initial year of three-year project

Formulation of basic plan

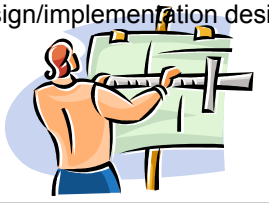


[Project detail]
In about three municipalities in Japan, workshops on major refurbishment will be held for school establishers, school-related parties, local citizens, and designers, etc.

[Subsidy]
Financial support for the cost related to the formulation of the basic plan

Second year of three-year project

Implementation of basic design/implementation design



[Project detail]
Develop the basic design and implementation design for major refurbishment based on the result of the workshops held in the initial year
* Design fees are included in the construction fee

Final year of three-year project

Implementation of Major refurbishment work

[Project detail]
Implementation of major refurbishment work based on the implementation design
Subsidy ratio (as of FY2013): 1/3
Project cost: Actual construction cost

[Subsidy] Financial support through Subsidy for Improving School Facilities and Environment (priority selection of project / addition of subsidy unit)

Results of Questionnaire Survey on the Consideration of Countermeasures against the Deterioration of Public School Facilities

Results of Questionnaire Survey on the Consideration of Countermeasures against the Deterioration of Public School Facilities

1. Aims of the survey

To understand the current conditions of deterioration of public elementary and secondary school facilities and efforts of municipalities to address the deterioration, and to make the results available for discussion at the Sub-committee on Countermeasures against Deterioration of School Facilities .

2. Outline of survey

(1) Survey target: Directors of the Facility Section at each Municipal Board of Education

(2) Period of survey: From May 2, 2012, to June 4, 2012

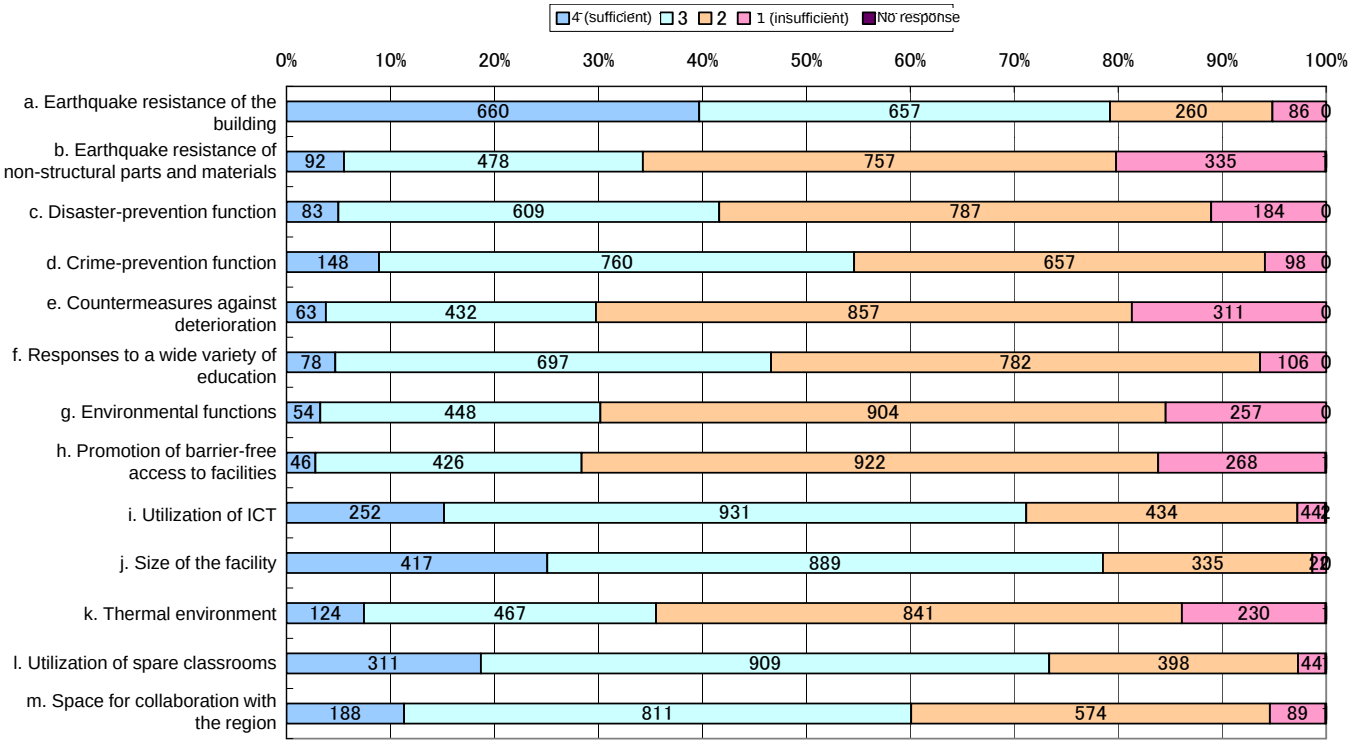
3. Survey result

- Number of municipalities 1,742
- Number of municipalities surveyed 1,666*
- Number of valid responses 1,663 (Response rate: 99.8%)

*Excluding municipalities having difficulty in submitting response due to impact of the Great East Japan Earthquake, etc. , and those having no facilities of over 25 years old.

Opinions on School Facilities Currently Possessed

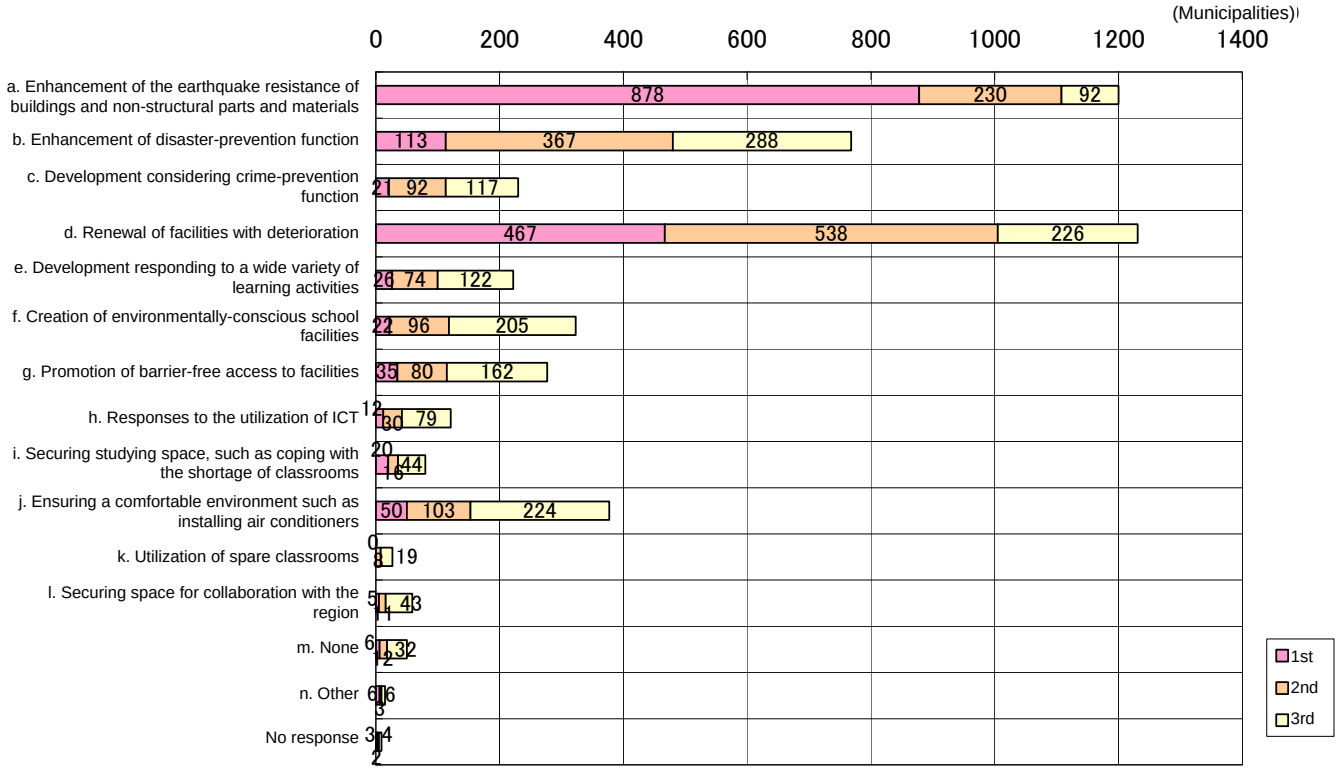
Many respondents say while earthquake resistance of the building and the size of the facility are sufficient, countermeasures against deterioration, earthquake resistance of non-structural parts and materials, environmental functions and promotion of barrier-free access to facilities are not sufficiently developed.



1. Survey on the General School Facility

School Facilities Development that is Considered as Especially Important in the Future

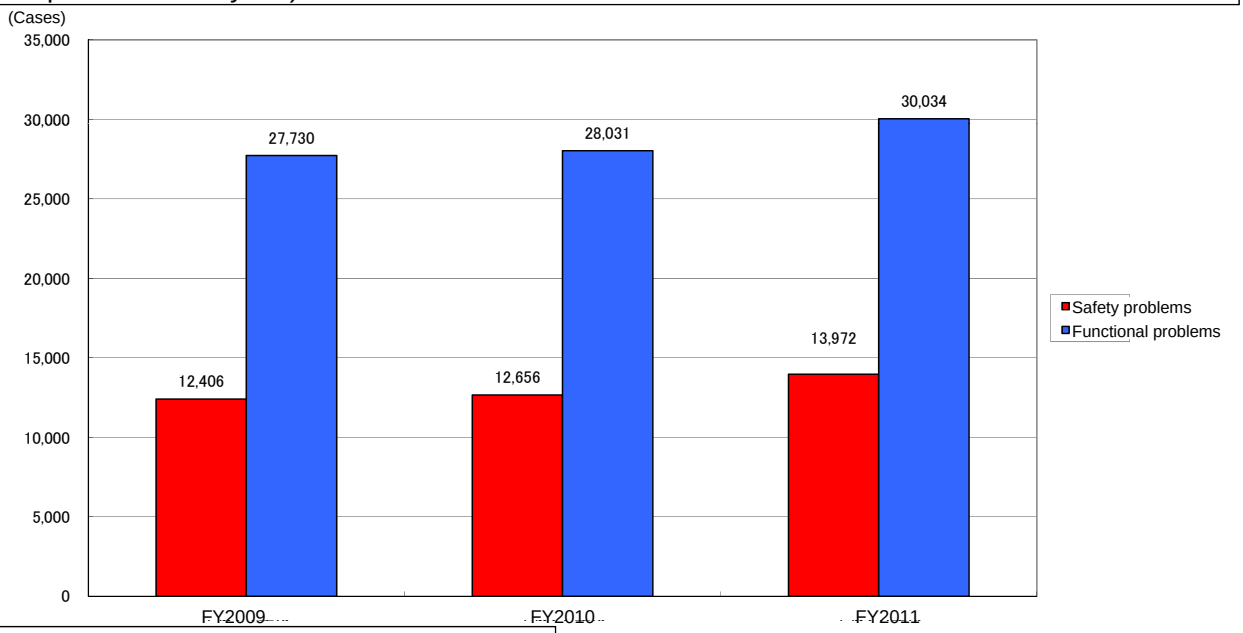
A number of municipalities place particular importance on renewal of facilities with deterioration, enhancement of the earthquake resistance of buildings and non-structural parts and materials, and enhancement of disaster-prevention function.



2. Countermeasures against deterioration of school facilities
(1) Current conditions of deterioration

Problems that Occurred Mainly Due to Deterioration

As for problems occurring in FY 2011, about 14,000 cases were safety-related and about 30,000 cases were function-related problems. (One in two schools had a safety problem and every school had a functional problem in the year.)



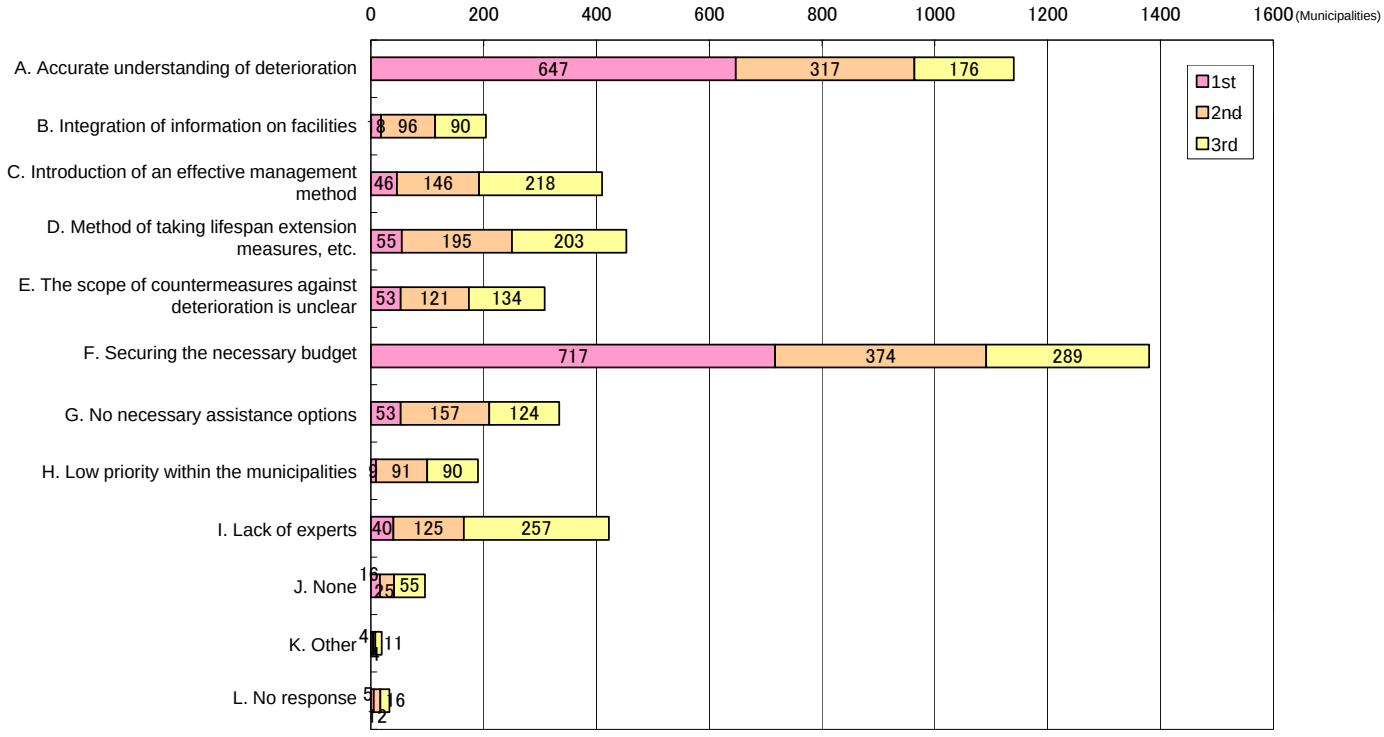
Safety problems: Cases where a building is damaged due to aging, and a part of it (mortars, tiles, windows, etc.) falls off
Functional problems: Cases where school activities were affected or where there were risks of damage to assets such as facilities, equipment, and fixtures, for instance by roof leaking caused by degradation

* Cases are counted within the scope understood by the boards of education (approximate figures are used where the accurate number of cases is unknown).
* In the case of municipalities where the number of cases is not known for last three years, it was calculated on the assumption that the number of problems occurred is the same as the most recent number.
* Damage caused by a major disaster, such as the Great East Japan Earthquake are excluded

2. Countermeasures against deterioration of school facilities
(1) Current conditions of deterioration

Issues to be Addressed in the Countermeasures against Deterioration

A number of municipalities consider securing a necessary budget and an accurate understanding of the deterioration as issues.

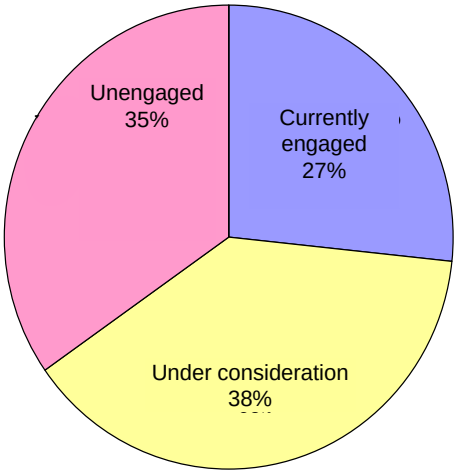


2. Countermeasures against deterioration of school facilities
(2) Planned development

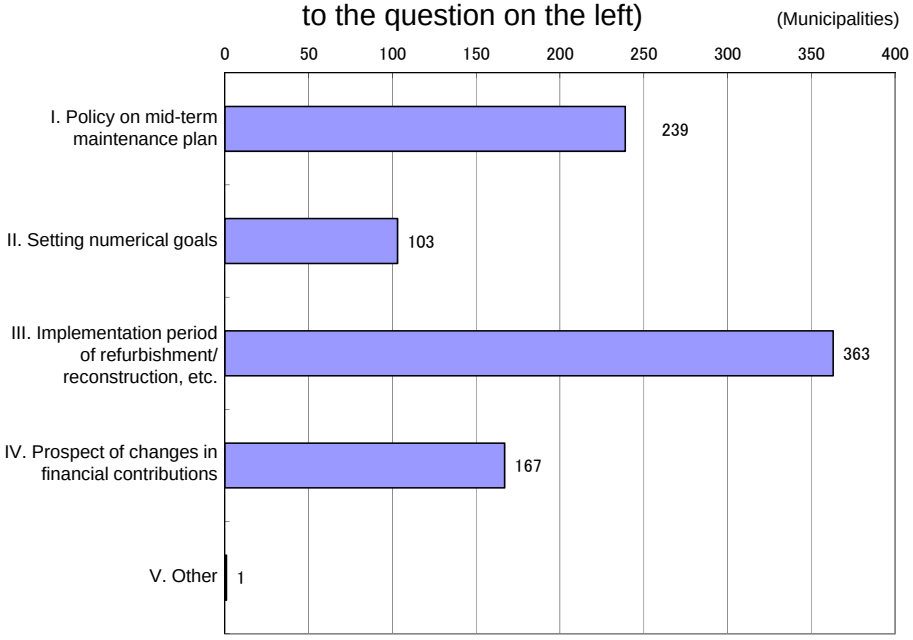
Formulation of Mid-term Plan to Address Deterioration

Only about 30% of municipalities are working on a mid-term plan

A. Formulation of a mid-term plan



B. Details (of respondents who answered "engaged" to the question on the left)



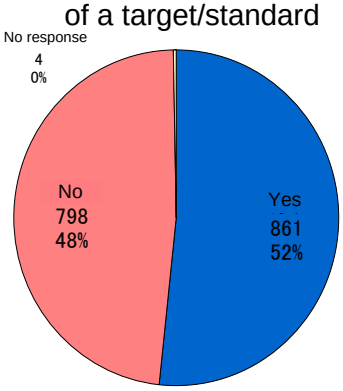
*Multiple answers accepted

2. Countermeasures against deterioration of school facilities
(2) Planned development

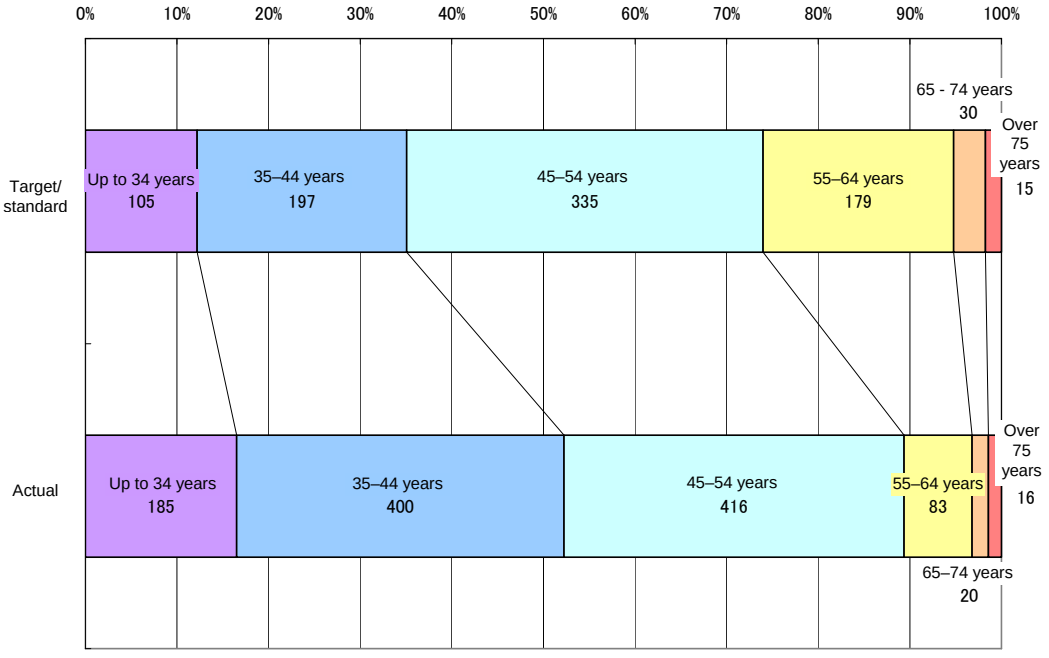
Reconstruction Cycle related to the Deterioration of School Buildings and Gymnasiums

A number of municipalities chose a reconstruction cycle of about 50 years, and a few chose one of over 65 years. The actual implementation tends to be earlier than the target/standard.

Presence or non-presence of a target/standard



Target/standard of reconstruction cycle and actual implementation



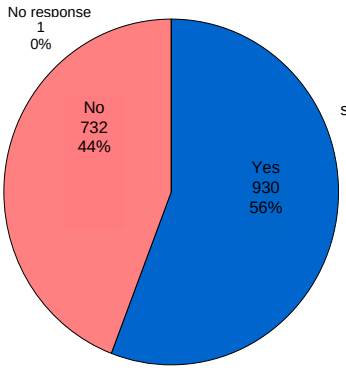
* Average buildings are selected

2. Countermeasures against deterioration of school facilities
(2) Planned development

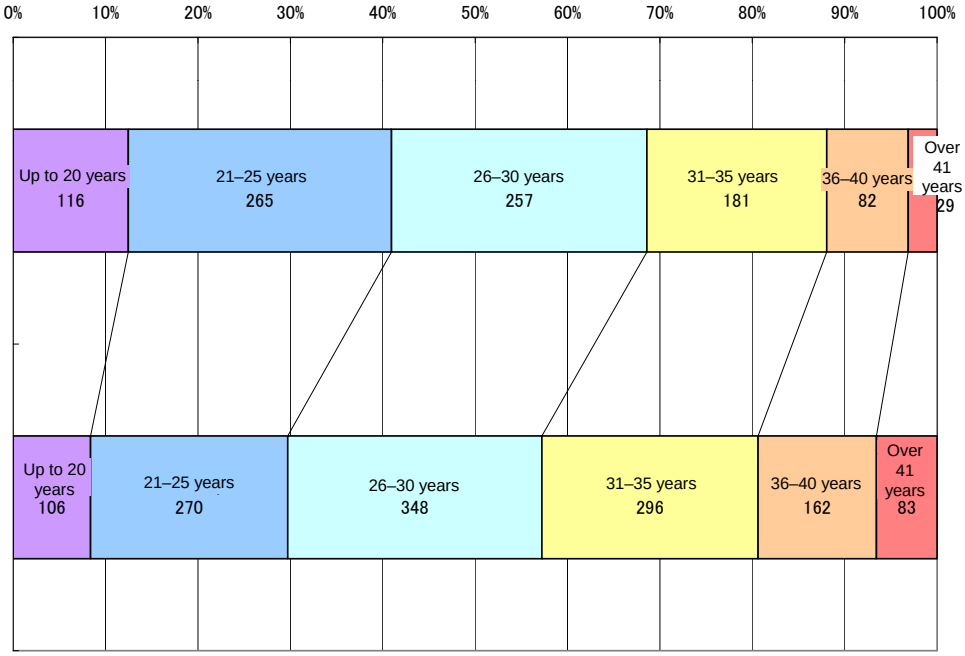
Cycle of Large-scale Refurbishment of School Buildings and Gymnasiums

A number of municipalities chose about 20–30 years as a target/standard for the refurbishment cycle. The actual implementation tends to be later than the target/standard.

Presence or non-presence of a target/standard



Target/standard of reconstruction cycle and actual implementation

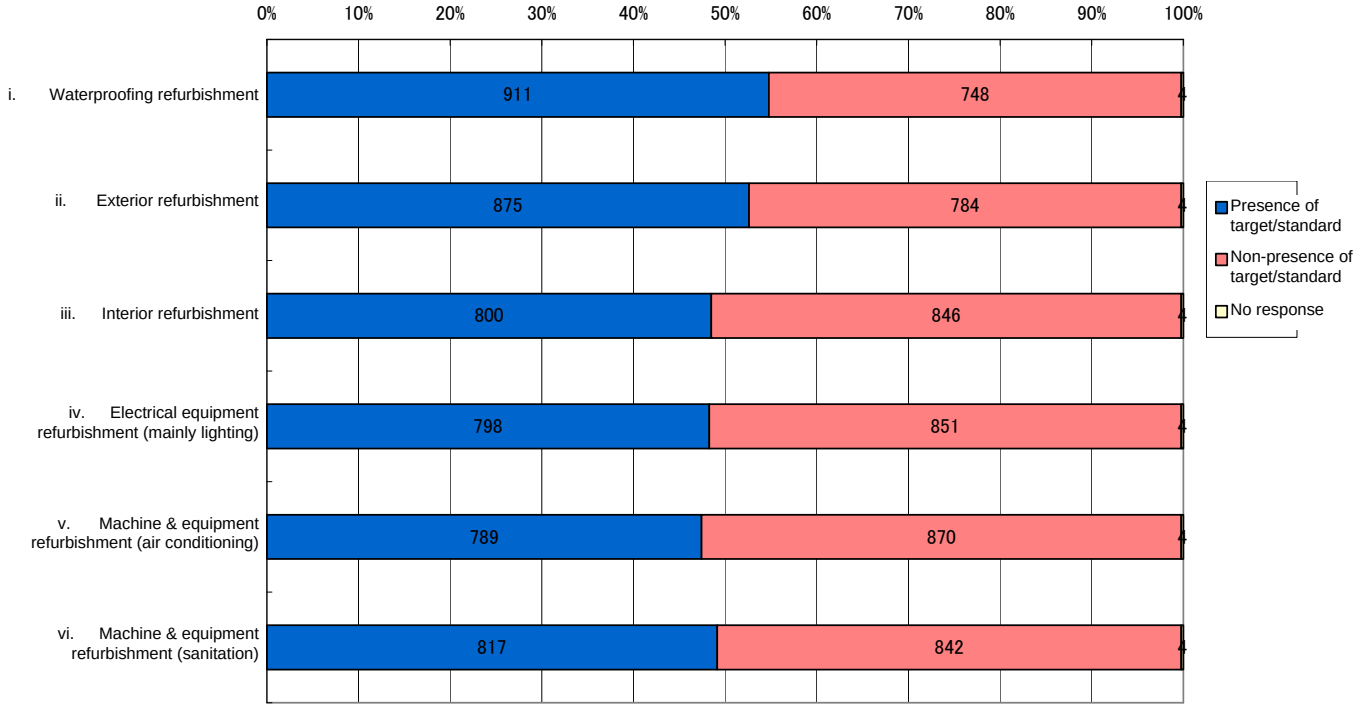


* Average buildings are selected

2. Countermeasures against deterioration of school facilities
(2) Planned development

Cycle of Medium-scale Refurbishment (Presence or Non-Presence of Target/Standard)

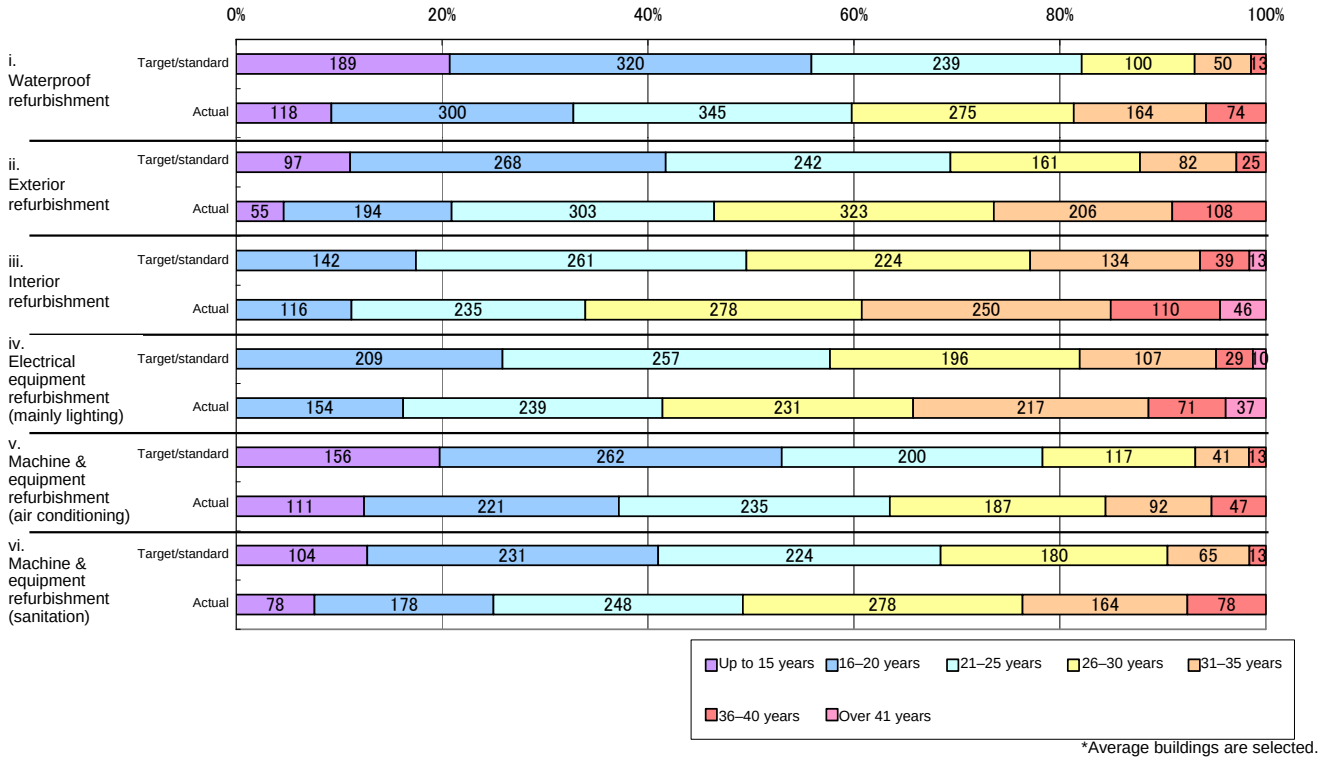
About half of all municipalities have set a target/standard for the cycle of medium-scale refurbishment



2. Countermeasures against deterioration of school facilities
(2) Planned development

Cycle of Medium-scale Refurbishment

Actual refurbishment on each work tends to be later than the target/standard

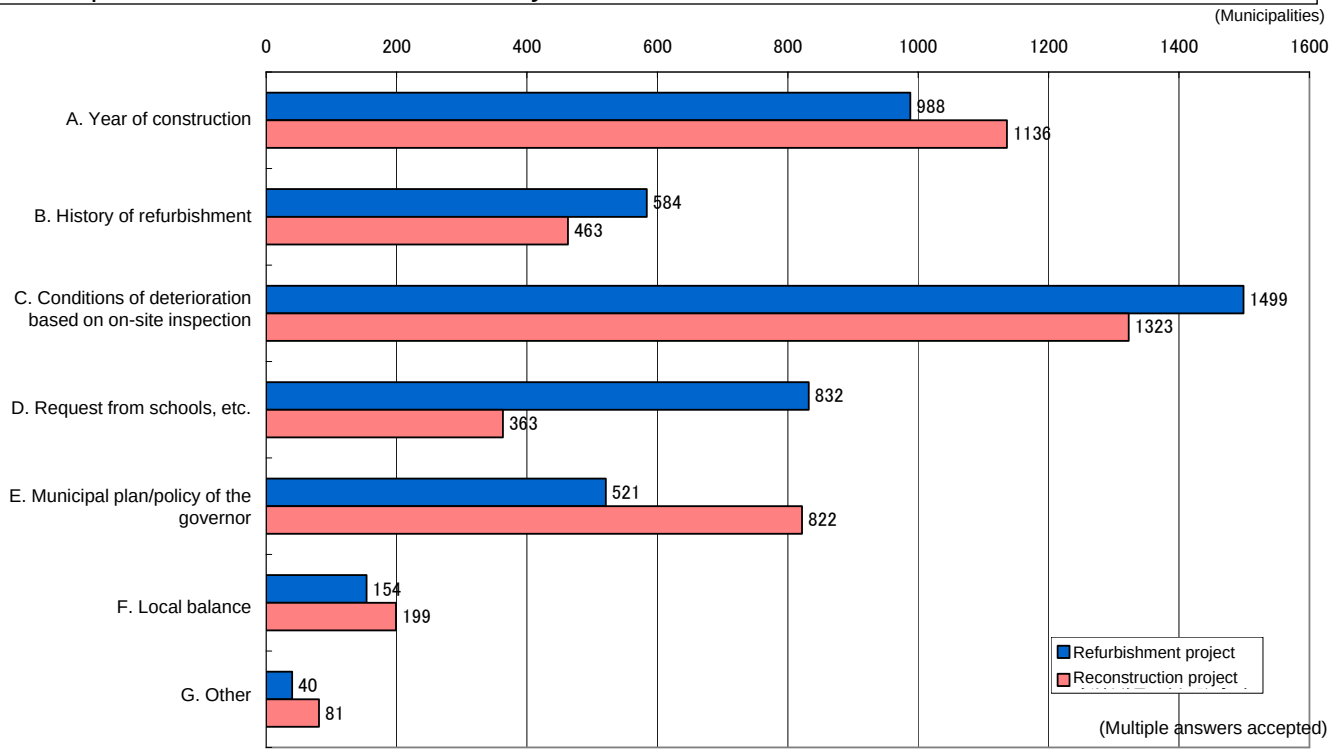


*Average buildings are selected.

2. Countermeasures against deterioration of school facilities
(2) Planned development

Prioritization of Refurbishment and Reconstruction Project

The largest number of municipalities decide on priority refurbishment/reconstruction based on on-site inspections of the conditions of facility deterioration

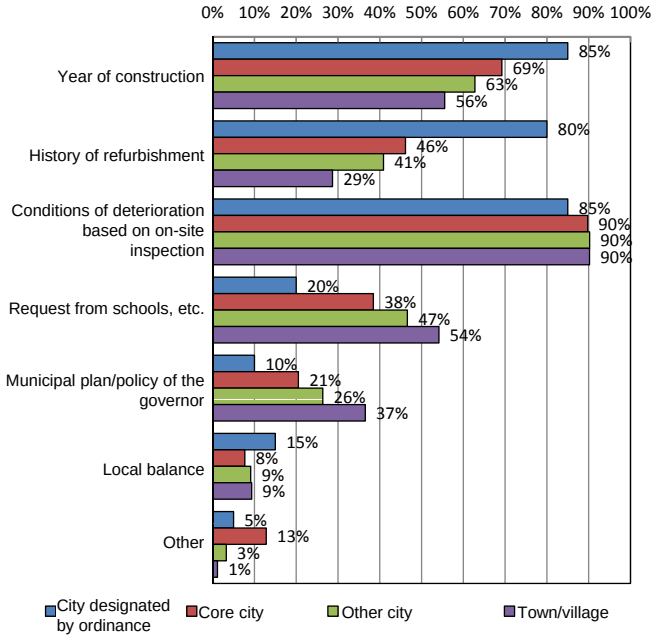


2. Countermeasures against deterioration of school facilities
(2) Planned development

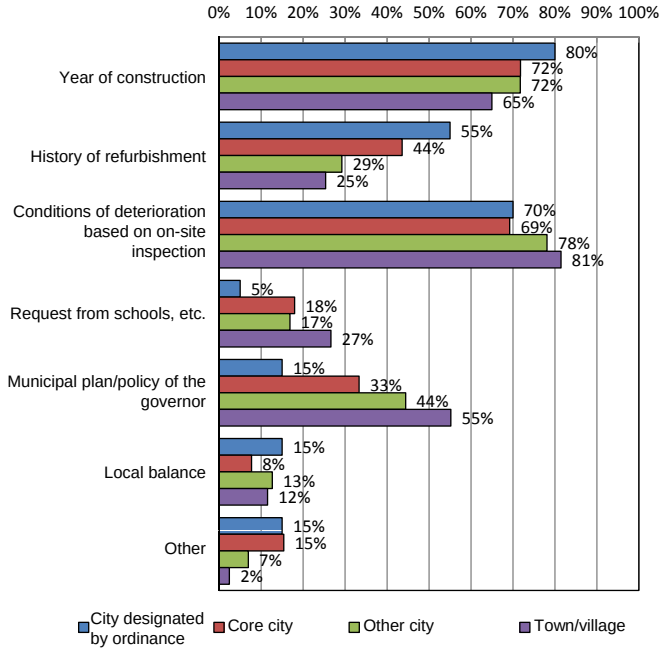
Prioritization of Refurbishment and Reconstruction Project (by the size of the municipality)

As the size of the municipality gets smaller, “requests from schools, etc.” and “municipal plan/policy of the governor” tend to become an important factor.

Refurbishment project



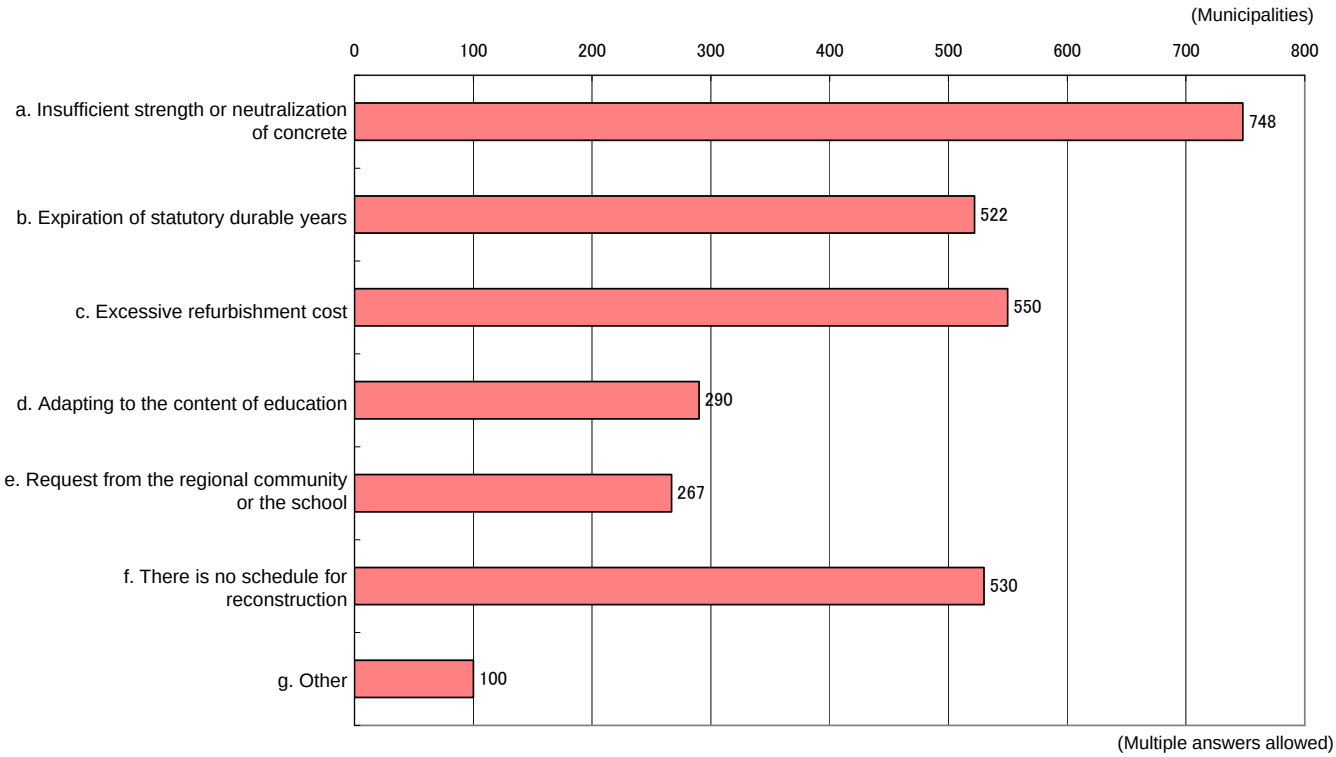
Reconstruction project



2. Countermeasures against deterioration of school facilities
(2) Planned development

Reasons for Selecting Reconstruction instead of Refurbishment

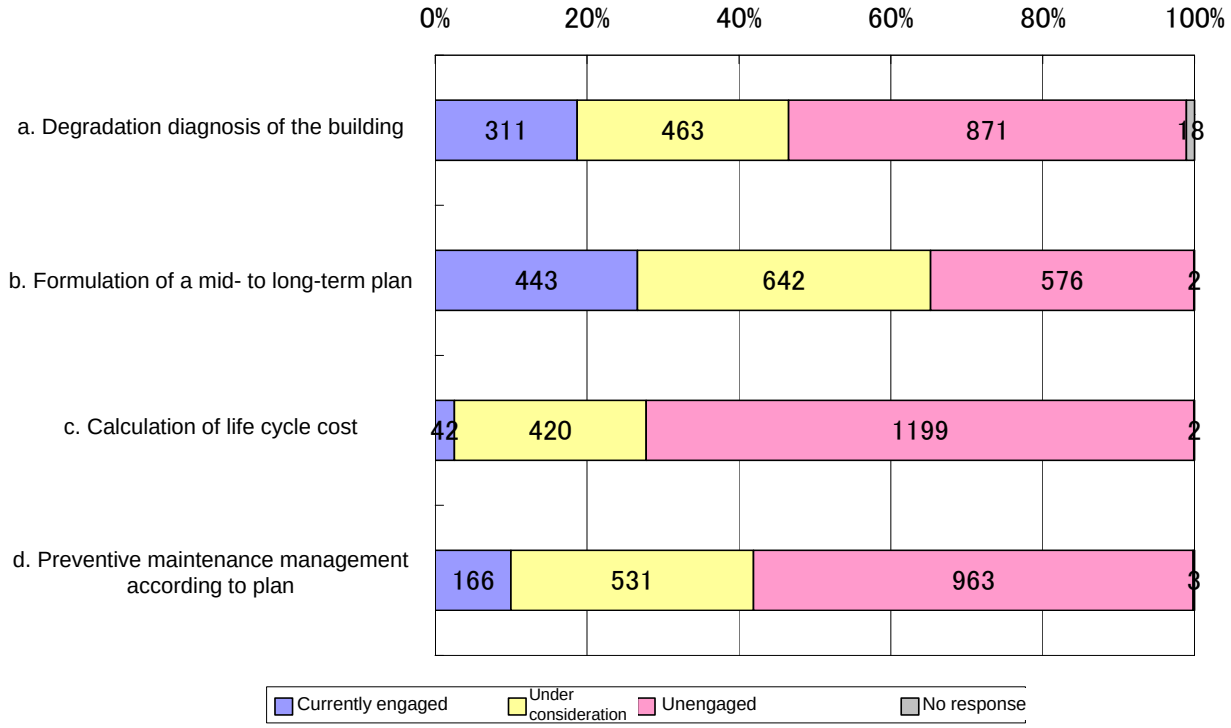
A large number of municipalities chose, “insufficient strength/carbonation of concrete,” “excessive refurbishment cost” and “elapse of statutory durable years.”



2. Countermeasures against deterioration of school facilities
(2) Planned development

Active Engagement in Taking Countermeasures against Deterioration

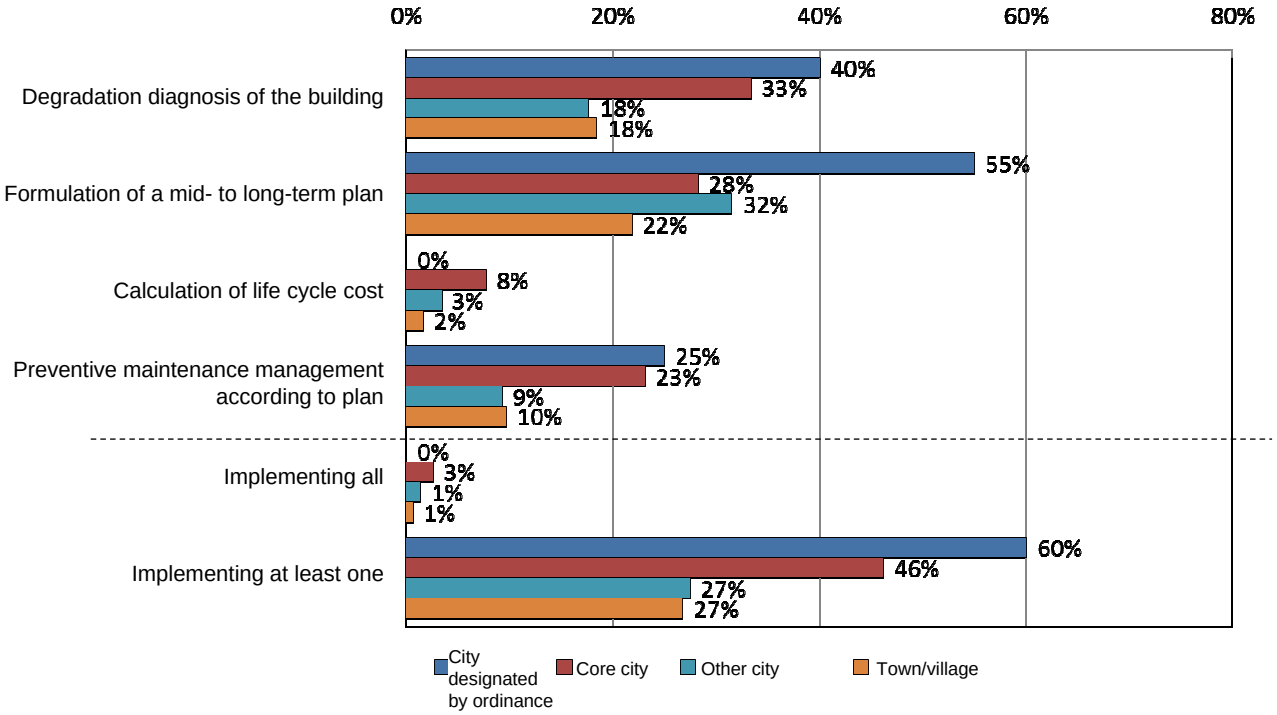
More than half of the municipalities are not actively engaged in taking countermeasures.



2. Countermeasures against deterioration of school facilities
(2) Planned development

Active Engagement in Taking Countermeasures against Deterioration (by the size of the municipality)

The bigger the size of the municipality, the more active its engagement.



Request for Governmental Information (Comments)

＜Major opinions＞

- ○Specific cases of lifespan extension, etc.
- ○Method, guidelines for refurbishment, lifespan extension, etc.
- ○Standard for timing of refurbishment and reconstruction
- ○Cost
- ○Method and index of degradation diagnosis
- ○Subsidy system

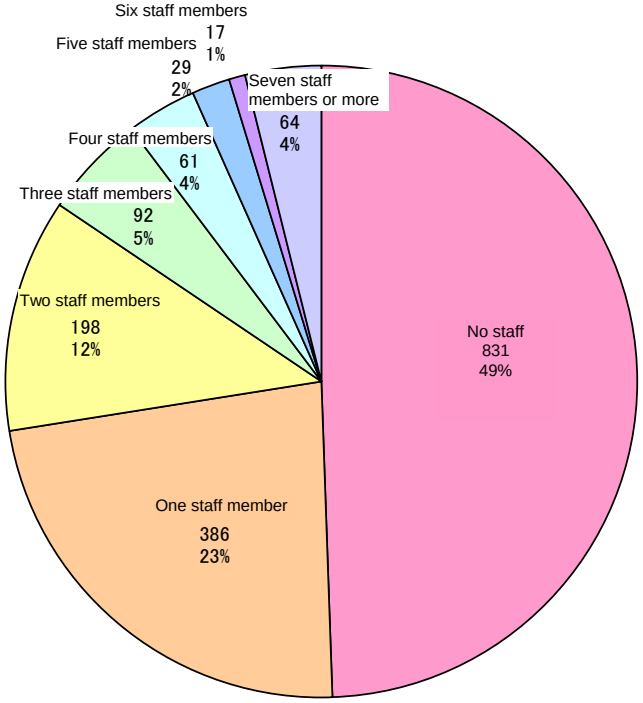
Request for Subsidy System (Comments)

＜Major opinions＞

- ○Raising subsidy ratio, increase in unit cost
- ○Raising upper limit for large-scale refurbishment (deterioration)
  (current: ¥200 million, in principle)
- ○Lowering lower limit for large-scale refurbishment (deterioration)
  (current: ¥70 million, in principle)
- ○Making partial refurbishment eligible for subsidy
- ○More variety of assistance options
- ○Streamlining and expediting procedures and system design with ease of use
- ○Adopting a project/securing a budget

Number of Technical Personnel in Charge of Facilities at Boards of Education

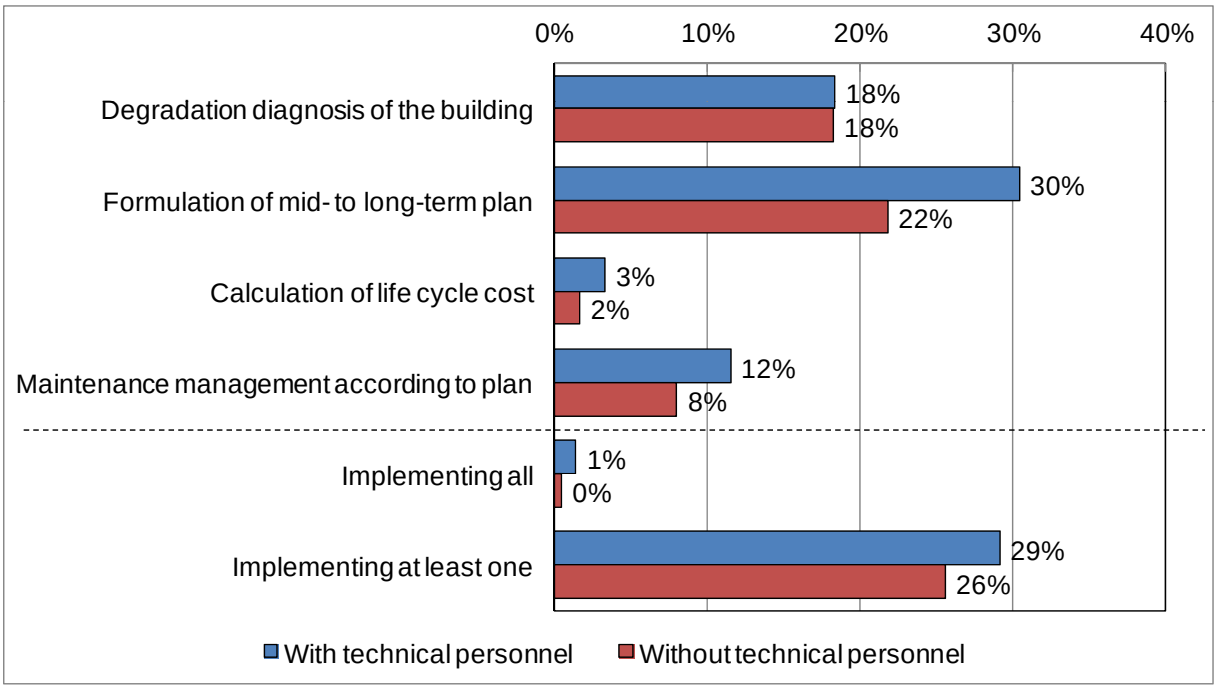
Nearly half of the municipalities are not staffed with technical personnel in charge of facilities.



* Figures show the number of municipalities
* Include municipalities that do not possess school facilities 25 years old or older

Active Engagement in Taking Countermeasures against Deterioration (Presence or non-presence of technical personnel)

Mid- and long-term plans are developed more in the municipalities with technical personnel then those without technical personnel.



Results of Questionnaire Survey on the Consideration of Countermeasures against the Deterioration of Public School Facilities (additional survey)

1. Aims of the survey

To understand the current conditions of deterioration of public elementary and secondary school facilities and efforts of municipalities to address the deterioration, and to make the results available for discussion at the Sub-committee on Countermeasures against Deterioration of School Facilities .

2. Outline of survey

(1) Survey target: Directors of Facility Section of each Municipal Board of Education

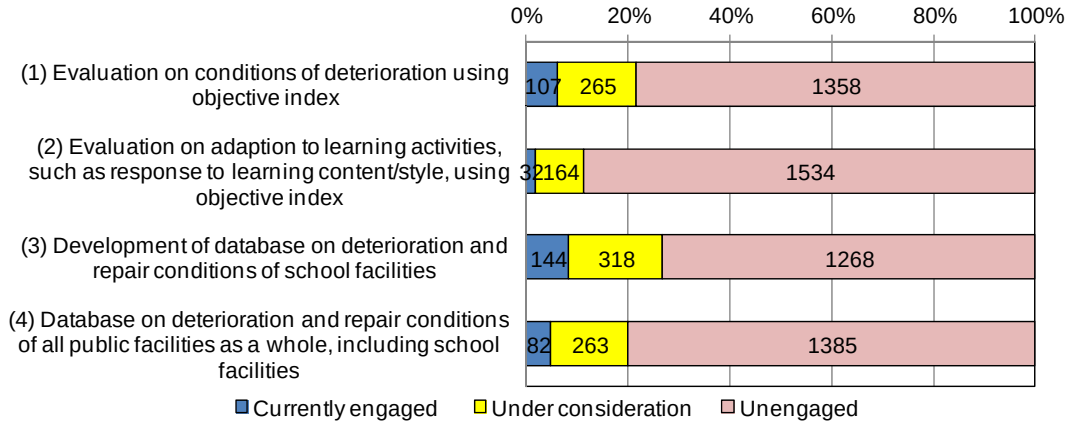
(2) Period of survey: From October 26, 2012, to November 13, 2012

3. Survey result

- Number of municipalities 1,742
- Number of valid responses 1,730 (Response rate: 99.3%)

1. Understanding/analysis of Current Conditions and Integration of Information

Less than 2% of municipalities have objectively evaluated the conditions of facilities, including adaption to educational content. Less than 8% of municipalities have developed a database on deterioration and repair conditions of school facilities.

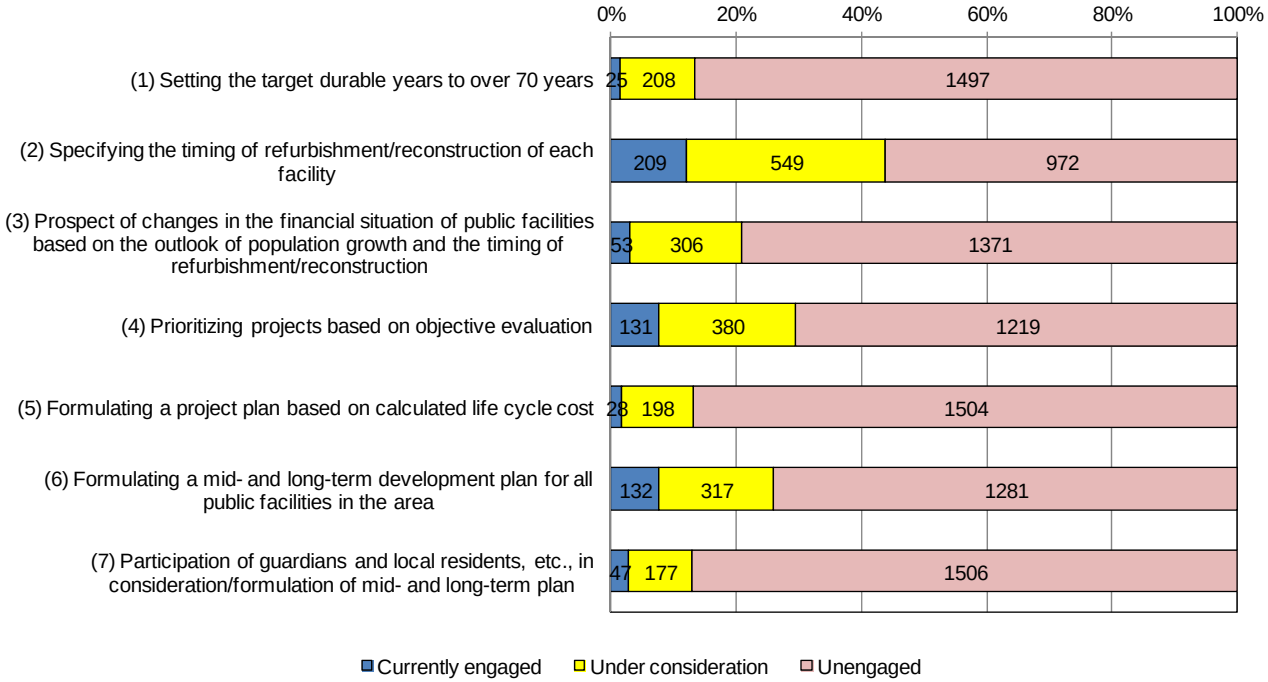


Specific cases

(1)	・Evaluation on a five-point scale for each part by technical personnel. Decision on priority by making a list. ・ Formulation and evaluation of independent inspection criteria.
(2)	・ Evaluation of “Adaptability to Learning Activities” when performing evaluations of school facilities.
(3) (4)	・Development of database on maintenance and repair conditions of facilities owned by the municipality. Search engines on computers. ・Conducting on-site inspections every several years and recording the conditions of facilities together with work history.

2. Consideration and Formulation of a Mid- and Long-term Plan

Municipalities are more committed to specifying the timing of refurbishment/reconstruction than other commitments



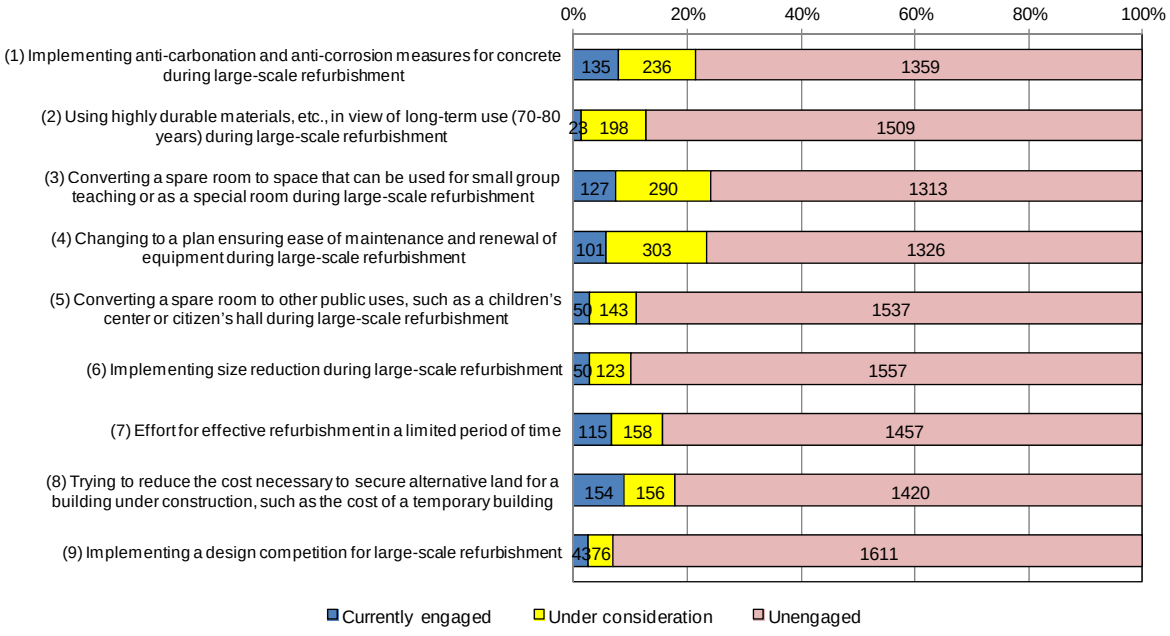
2. Consideration and Formulation of a Mid- and Long-term Plan

Specific cases

(1)	• Setting the target at over 90 years in principle assuming that maintenance and refurbishment work is carried out appropriately on a regular basis. • Setting the target durable years of public structures at over 70 years in principle by specifying the basic policy on lifespan extension.
(2)	• Specifying the timing of implementation of earthquake resistance refurbishment and the reinforcement plan. • Setting the timing of refurbishment/reconstruction based on the years since construction.
(3)	• Calculating the timing/scale of extension based on the prospect of population growth and estimating a rough balance based on previous work. • Simulating when formulating a long-term maintenance plan.
(4)	• Implementing relative evaluation of deterioration conditions of each building by applying Analytic Hierarchy Process (AHP). • Evaluating deterioration by patrolling the school with engineers when conducting annual facility inspections.
(5)	• Engaging in the process of formulating a long-term maintenance plan. • Currently formulating a mid- and long-term plan for building maintenance in this fiscal year and a survey aiming for building lifespan extension.
(6)	• Formulating a long-term repair plan by the Supply Division and the Board of Education. • Currently formulating the White Paper on Public Facilities of the city by setting up a section in charge of a facility revival plan within the Management Policy Division. A plan will be formulated and promoted based on the White Paper.
(7)	• Participation of resident's council, PTA members and university professors (advisors) in the Study Committee for the preparation of a development plan. • Participation of representatives, etc. appointed through public solicitation, etc. for the preparation of a plan.

3. Implementation of Refurbishment

Little work for major refurbishment has been implemented.
About 1% of municipalities are making efforts to reduce the cost of acquiring alternative land for the buildings under construction.



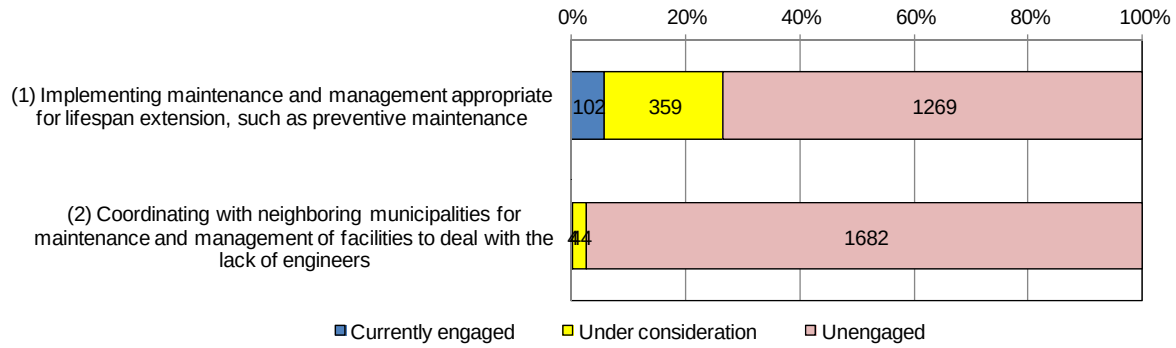
3. Implementation of Refurbishment

Specific cases

(1)	• Implementing anti-carbonation measures during refurbishment of external walls. • Repainting external walls and repairing broken mortar
(2)	• Using high strength concrete. • Using long life lighting equipment, etc.
(3)	• Conversion to a multi-purpose hall or small-group learning room. • Remodeling to a learning support room in response to an increase of children needing special education.
(4)	• More pipes are installed on the exterior of a building and more inspection doors are installed. • Change from the central system to an individual system when renewing the heating system.
(5)	• Converting a spare room at an elementary school to a nursery school. • Conversion to a local activity center, such as community room.
(6)	• Downsizing to a two-story building from a three-story building during earthquake resistance reinforcement. • Partially removing a deteriorated building and transferring the function to the remaining building.
(7)	• Using a building closed due to school integration as a temporary school building. • Early construction order so that construction can start soon after the summer break begins.
(8)	• Using a building closed due to school integration as a temporary school building • Using a spare class at an elementary school as a temporary building while a lower secondary school is being refurbished.
(9)	• Adopting a proposal system when selecting the design company.

4. Other Efforts

Little coordination with neighboring municipalities is carried out with respect to maintenance and management of facilities.



Specific cases

(1)	・Planning inspection and refurbishment of buildings owned by the city by internally setting up a technology section. ・Planning preventive maintenance work annually for the next three years based on maintenance data

Cases of problems due to deterioration

Exterior

Fallen mortar slabs
(31-year-old building)

External mortar peeled off and lightly injured a student (29-year-old building)

Mortar slabs fell from the eaves of the gymnasium (44-year-old building)

Tiles fell from the eaves
(34-year-old building)

Part of deteriorated roof materials peeled off due to strong wind (26-year-old building)

Corroded railing broke when several children leaned against it at the same time

Deterioration of the waterproof layer. Water leaked inside, damaging the ceiling and floor of a corridor (37-year-old building)

Although earthquake resistance reinforcement is complete, deterioration of the appearance is serious.

Interior

Corroded wooden hanging material fell from the ceiling due to a rainwater leak (50-year-old building)

Deterioration of the ceiling due to a rainwater leak (38-year-old building)

Deterioration of the ceiling due to a rainwater leak (31-year-old building)

Broken computers due to a rainwater leak

Damage to the ceiling and floor boards due to a rainwater leak (29-year-old building)

Rain-soaked floor (38-year-old building)

Equipment

Corrosion of steel pipes for fire extinguishing due to erosion by rainwater (38-year-old building)

An outdoor fire extinguishing pipe burst. A hydrant was not usable for a while and foam extinguishers were used temporarily

Rusted rainwater drainage pipe with a hole, in the attic, causing a rainwater leak (30-year-old building)

Rusty tap water in the teachers' toilet

Broken lighting ballast (41-year-old building)

Toilet bowls blocked due to a build up of calcium (34-year-old building)

“Countermeasures against the Deterioration of School Facilities” (Summary)

Countermeasures against the Deterioration of School Facilities; Promotion of the Lifespan Extension of School Facilities (Summary)

March 2013, Committee for Research Studies on the Visions of School Facilities

Part 1: The Vision of Countermeasures against the Deterioration of School Facilities

I. Current Situation Surrounding School Facilities and Problems Thereof

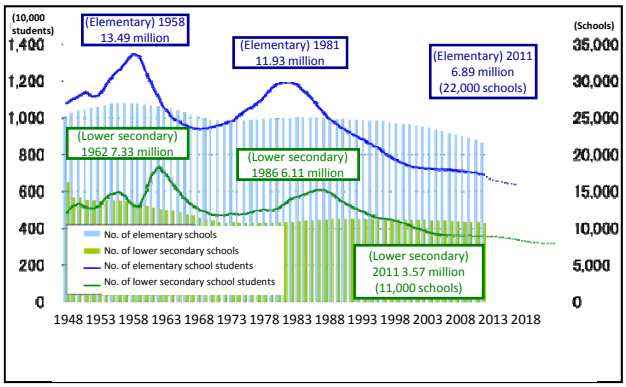
1. Roles of school facilities

○ Space for children's studying and living ○ Base for regional communities and disaster prevention
○ Facility that accounts for about 40% of the entire public facilities

2. Current situation of school facilities

(1) Situation surrounding schools

○ The number of students and schools is decreasing due to the lower number of children, and it is expected to further decrease in the future.
On the other hand, the area of school facilities has recently remained unchanged.

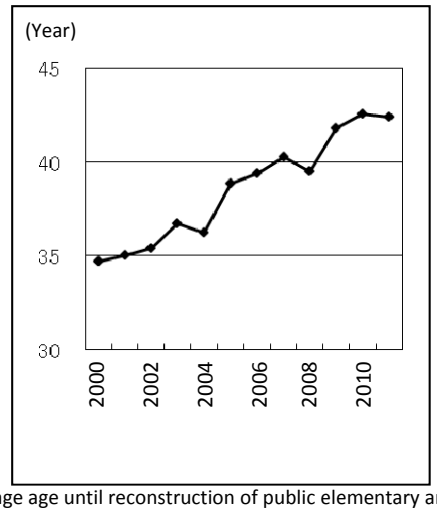


Changes in the number of elementary and lower secondary schools and the number of students

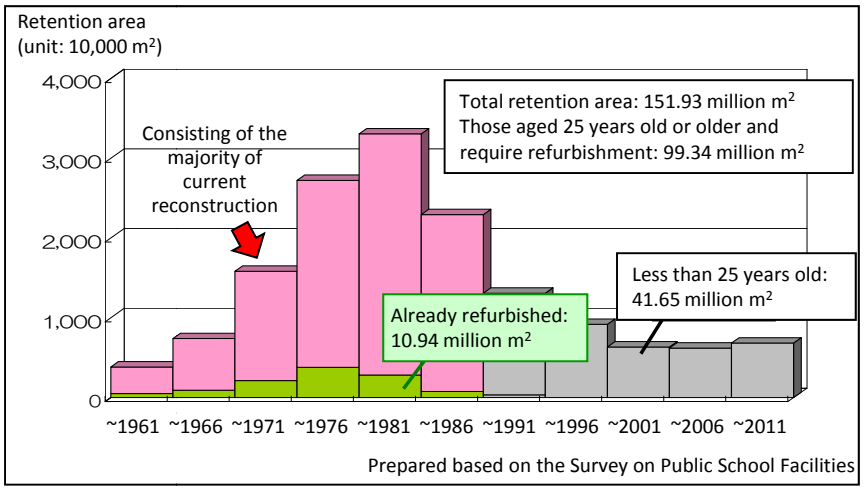
(2) Increase in the number of aged facilities

○ Many elementary and lower secondary schools were developed in the 1970s and early 1980s, when the number of students increased rapidly. Among the non-wooden facilities covering a total of about 150 million m², about 70% are 25 years old or older and require refurbishment.

○ The average age of school facilities that were reconstructed is about 42 years. Schools constructed by around 1969 are now being reconstructed. Because more than 30 million m² of school facilities have been developed in the period from 1977 to 1981, countermeasures against deterioration need be implemented with considerable expenses in the near future.



Average age until reconstruction of public elementary and lower secondary schools (made of reinforced concrete)



Retention area of public elementary and lower secondary schools by age (school building not made of wood, gymnasiums and dormitory houses)

(3) Recognition by local governments

○ According to the results of the questionnaire survey, about 70% of municipalities responded that countermeasures against deterioration are either insufficient or somewhat insufficient.
As for the issue considered especially important in the future, the largest number of municipalities responded with "the renewal of facilities with degradation."

3. Necessity of countermeasures against deterioration

○ Safety issues: Falling outer walls and window frames and deteriorating structural strength
(Safety problems: About 14,000 cases [in 2011])
○ Functional issues: Roof leaking, damage to equipment instruments and pipework, toilet sanitary and barrier-free access problems, unable to adapt to the current contents and methods of education (Functional problems: About 30,000 cases [in 2011])
○ Environmental issues: Not coping with energy saving and a major waste of energy
○ Financial issues: Vast amount of renewal expenses will be required with the considerable increase in the number of facilities with degradation in the future

(Left) Fallen mortar (Right) Damage to pipework due to degradation

II. Basic Idea of Countermeasures against Deterioration

1. Ideal state

○ Ensuring a safe and secure facility environment ○ Improvement of the quality of the educational environment
○ Formulation of regional community bases

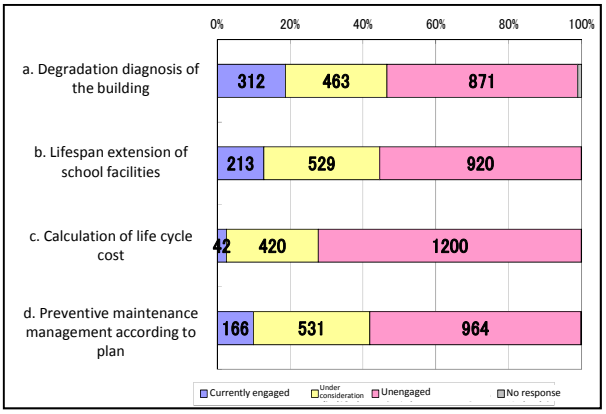
2. Direction of measures

(1) Development according to plan

○ Shift from corrective maintenance to preventive maintenance
○ Grasping of degradation degree and adapting to the contents of education
○ Formulation of a mid- to long-term development plan specifying the time and scale of refurbishment

(2) Lifespan Extension of School Facilities

○ Facilities are currently reconstructed after about 42 years on average.
However, it is technically possible to extend the lifetime to about 70 years or even more than 100 years.



Engagement in countermeasures against deterioration by local governments

○ Under the severe fiscal condition, it is necessary to shift from reconstruction to major refurbishment (for lifespan extension of school facilities) that requires less expenses.
It is important to make an improvement of the durability of the facility and fulfilling the modern social demand, such as energy saving, adapting the current contents and methods of education, and providing barrier-free access.

[Reference] Estimation of renewal expenses that become necessary in the next 30 years
Conventional style of development (mainly reconstruction): Approx. 38 trillion yen
⇨ Development mainly major refurbishment: Approx. 3 trillion yen
*The result of estimation may change according to the progress of construction technology and decrease in retention area.

(3) Prioritization and Concentration

○ Because a further decrease in the number of students is expected in the future, it is necessary to ensure the adequate size of facilities.
The effective use of vacant space, such as spare classrooms, should be promoted, while it is necessary to create a complex with public facilities or downsize school building premises.

III. Specific Measures on Renewal and Development in the Local Government

1. Development of facilities through the PDCA cycle
(P) Ascertaining the current situation of the degradation of facilities and the formulating a mid- to long-term development plan; (D) Refurbishment and adequate maintenance; (C) Continuous evaluation; (A) Streamlining points to be improved

2. Reinforcement of the organizational system
○ Organizational system should be reviewed by obtaining cooperation from departments in charge of repairs

IV. Promotional Measures by the National Government

1. Promotion of development according to plan: Support for the formulation of a mid- to long-term development plan, establishing of a system to provide technical support

2. Promotion of the Lifespan Extension: Preparation of guidelines on specific examples of major refurbishment; Improvement of national subsidies system (creation of the Project on -Major Refurbishment)

3. Promotion of Prioritization and Concentration : Development of evaluation index on degradation level and environmental performance; Reviewing of the necessary area (area that serves as a benchmark for national subsidies)

Part 2: Advanced Case Examples

* 26 case examples that can be used as a reference by local governments when implementing countermeasures against deterioration are included.

1. Understanding the Current Situation of School Facilities: (Nagoya City) Study on the durability of facilities 40 years old or older

2. Life Extension of School Facilities: (Yame City, Fukuoka Prefecture) Refurbishment of the 40 year-old indoor gymnasium like a new facility with reduced construction cost

3. Formulation of a Mid- to Long-Term Plan: (Saitama City) Formulation of a facilities management plan based on the future plan for the next 40 years, and the holding of symposiums to obtain citizens' understanding

4. Effective Use of School Facilities: (Shiki City, Saitama Prefecture) Creation of a complex facility combining a school, citizens' public hall, and library

5. Reduction of Cost with an Ingenious Refurbishment Method: (Otsu City) The second floor of the school building being demolished and earthquake resistance improved