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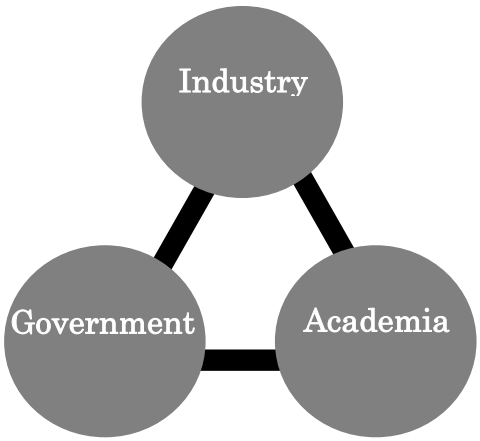
Introduction

Humanity in this century faces the great task of striving for sustainability in all areas. Construction, which consumes and discards resources and energy in enormous quantities, is one field where we must act urgently to develop and promote techniques and policies able to assist the drive towards sustainability.

There has been a growing movement towards sustainable construction since the second half of the 1980s, leading to the development of various methods for evaluating the environmental performance of buildings. Methods developed overseas include BREEAM (Building Research Establishment Environmental Assessment Method) in the UK, LEED™ (Leadership in Energy and Environment Design) in the USA, and GB Tool (Green Building Tool) as an international project. These methods have attracted interest around the world. This kind of assessment, with the publication of the results, is one of the best methods now available to provide an incentive for clients, owners, designers and users to develop and promote highly sustainable construction practices. Japan has already accumulated a large body of knowledge and expertise as the basis for environmental assessment and management, and much of it is readily applicable to measures for promoting sustainability.

This situation prompted the formation of the Japan Sustainable Building Consortium (Secretariat: The Institute for Building Environment and Energy Conservation) in April 2001, as a joint project between industry, government and academia, with the assistance of Japanese Ministry of Land, Infrastructure and Transport. The Consortium's research has produced the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE). Overall management of CASBEE development has been carried out by newly-formed JSBC (Japan Sustainable Building Consortium) and its affiliated sub-committees. CASBEE is a tool for comprehensive assessment of the environmental performance of buildings, based on new concepts such as Building Environmental Efficiency (BEE). The development and promotion of CASBEE is an element in " Japanese Ministry of Land, Infrastructure and Transport Environmental Action Plan" and "The Interim Report of the Environment Working Group of the Social Capital Development Council - Global Warming Countermeasures in the Context of Social Capital Development." We hope that CASBEE will be used extensively in future at the planning, design and construction stages of buildings, and thereby help to promote sustainable buildings in Japan.

Japan Sustainable Building Consortium (JSBC)
Shuzo Murakami, Chair



Part I. CASBEE for New Construction

1. CASBEE: Framework for New Construction

1.1 Framework of CASBEE: CASBEE family

CASBEE is a suite of four basic assessment tools that deal with building life cycles.
The four tools have the following roles:

(1) CASBEE for Pre-design (CASBEE-PD)

This tool aims to assist the owner, planner and others involved at the planning (pre-design) stage of the project. It has two main roles:

1) To assist in grasping issues such as the basic environmental impact of the project and selecting a suitable site.
2) To evaluate the environmental performance of the project at the Pre-design stage.

(2) CASBEE for New Construction (CASBEE-NC)

This is a self-assessment check system that allows architects and engineers to raise the BEE value of the building under consideration during its design process. It makes assessments based on the design specification and the anticipated performance. It can also serve as a labeling tool when the building is subjected to expert third-party assessment. Remodeling and replacement construction are evaluated under CASBEE for New Construction.

(3) CASBEE for Existing Building (CASBEE-EB)

This assessment tool targets existing building stock, based on records of environmental management for at least one year after completion. It was developed to be applicable to asset assessment as well.

(4) CASBEE for Renovation (CASBEE-RN)

There is growing demand for building stock renovation, especially in Japanese market. In the same way as “CASBEE for Existing Building,” this tool targets existing buildings. It can be used to generate proposals for building operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects, which will be increasingly important in future, and for building stock renovation. This tool is designed for ascertaining the degree of improvement (increased BEE), relative to the level that preceded renovation. Labeling is also possible by third-party agencies.

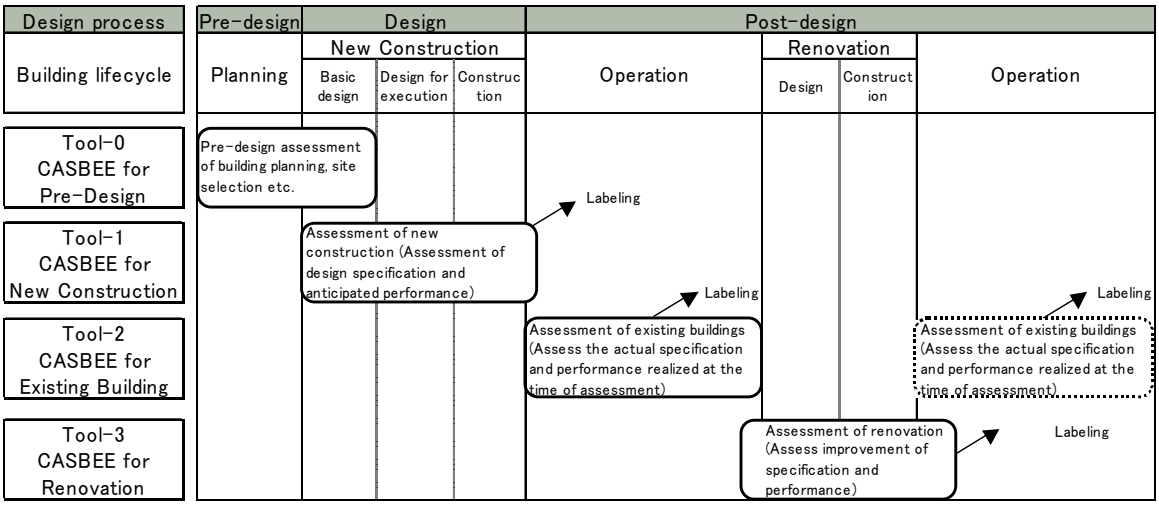


Figure 1.1 CASBEE and Building Life Cycle

1.2 “CASBEE for New Construction” assessment targets and the period of validity of assessments

At the Preliminary Design, Execution Design and Construction Completion stages, the environmental quality and performance of the building and its load reduction performance are evaluated as shown in Figure 1.2. As environmental performance and assessment criteria change over time, the results of assessments under “CASBEE for New Construction” only remain valid for three years after the completion of construction. After that limit, buildings are evaluated using “CASBEE for Existing Building.”

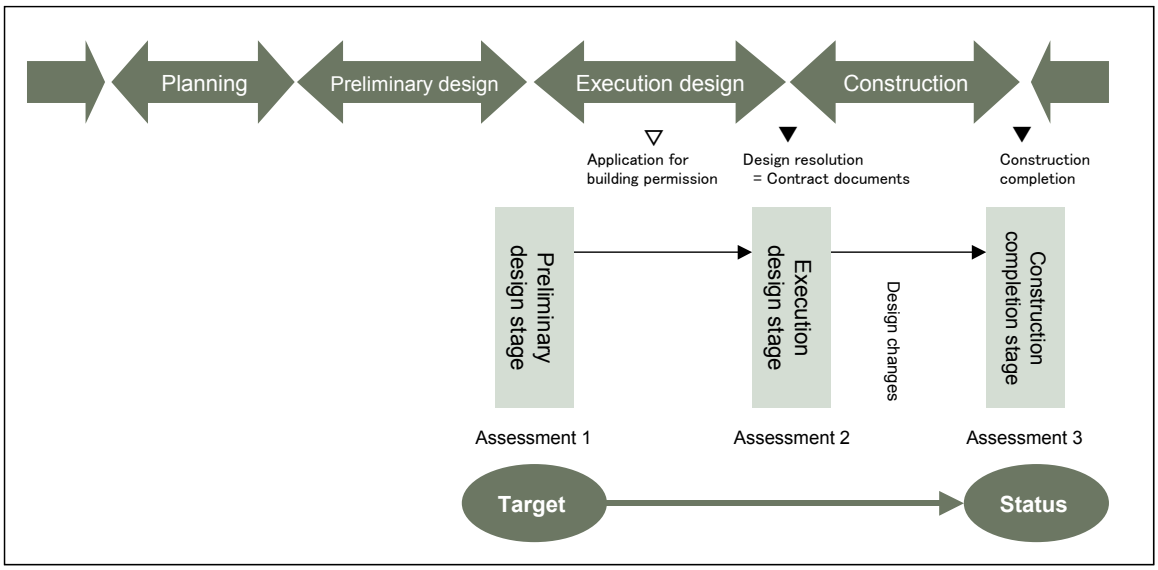


Figure 1.2 Assessment Stages of CASBEE for New Construction

1.3 How "CASBEE for New Construction" is used.

"CASBEE for New Construction" is used in the following four main ways:

1) For designers to employ in designing for the environment (DfE). The building is checked for environmental efficiency at the design stage, in order to provide the building owner with an objective view of the building's environmental design content.
2) It can be used as a labeling tool for assessment of new buildings by third-party agencies, for asset assessment and other purposes.
3) It can be used in construction administration. In April 2004, Nagoya introduced a building DfE system called CASBEE Nagoya, based on "CASBEE for New Construction (simplified)." Osaka adopted guidelines in May 2004 for Osaka Municipal Comprehensive Assessment System for Building Environmental Efficiency (CASBEE Osaka), and the system is scheduled for introduction in October 2004. Similar moves are under way in regional governments throughout Japan.
4) It can be used in design competitions, proposals and the selection of PFI operators. Designers can use it to propose overall environmental efficiency targets to public or private owners, and it can assign high grades to designers who deliver the maximum environmental efficiency from limited funds. It can be used internationally, as well as in Japan.

1.4 Judgment standards for "CASBEE for New Construction"

1) The assessment criteria used for CASBEE are updated over time to reflect changing perceptions of the environment and technological innovations. Therefore, the latest assessment criteria available at the time must be used to make assessments.
2) Evaluate according to information that becomes progressively more detailed in each stage, from the Preliminary Design to Execution Design and Construction Completion.

1.5 Basic approach to the assessment by "CASBEE for New Construction"

The development of "CASBEE for New Construction" was based on the following policies, with the aim of achieving widespread use.

1) The tool should be a positive assessment tool for designs with superior environmental consideration, rather than simply a negative checker, to motivate designers, clients and others to be more interested in using it.
2) It should be a general-purpose tool, able to evaluate buildings with wide-ranging types and sizes, with the assessment system kept as simple and comprehensible as possible.
3) To ensure widespread use, it should have a flexible structure able to reflect innovative initiatives taken by users based on their organizational circumstances.
4) The assessment criteria should make maximum use of existing, established assessment methods, such

as energy-saving standards (PAL/ CEC) and the Housing Performance Indication System, and aim for conformity with those methods, in order to save time and money in the assessment process.

5) The system should be able to make simple assessments based on input of environmental performance information available at the various design and construction stages (Preliminary Design Stage - Execution Design Stage – Construction Completion Stage). Also, the tool configuration should be able to provide specific information for reference concerning environment-friendly design at each stage.

2. Assessment Method

2.1 Building Types Targeted for Assessment by CASBEE for New Construction

The main building types targeted for assessment by “CASBEE for New Construction” are offices, schools, retail stores, restaurants, meeting halls, hospitals, hotels and apartments. Individual houses are currently excluded from consideration. For factories, the assessment should mainly be carried out on residential area, and exclude the production area.

The building types covered are broadly divided into “non-residential” and “residential.” In particular, the hospitals, hotels and apartments that fall in the residential category are buildings that include living or accommodation space for users (referred to below as Residential and Accommodation Sections. Assessment of these buildings with residential building types is divided between Residential and Accommodation Sections and other common sections (referred to below as Entire Building and Common Properties).

Table 2.1 Building Types Targeted for Assessment (divided into Non-residential and residential)

Classification	Building type	Types included
Non-residential	Offices	Offices, government buildings, libraries, museums, post offices etc.
	Schools	Elementary schools, junior high schools, high schools, universities, technical colleges, higher vocational school and other school types
	Retailers	Department stores, supermarkets etc.
	Restaurant	Restaurants, canteens, cafes etc.
	Halls	Auditoria, halls, bowling lanes, gymnasia, theaters, movie theaters, pachinko parlors etc.
	Factories	Factories (exclude manufacturing area), garage, warehouse, the stands, wholesale market etc.
Residential	Hospitals	Hospitals, homes for elderly, welfare homes for the handicapped etc.
	Hotels	Hotels, inns etc.
	Apartments	Apartments (dwellings are not applied)

2.2 Approach to Scoring Criteria

One characteristic of CASBEE is that it assigns separate scores for Q (Quality: the environmental quality and performance of the building) and L (Loadings: the building's environmental loading) and ultimately gives an assessment of Building Environmental Efficiency (BEE) as an indicator based on the results for Q and L. L is first evaluated as LR (Load Reduction). That approach is employed because "higher marks for improving load reduction quality" is easier to understand than "higher marks for load reduction" as an assessment system, just as "improvements in quality and performance earn higher marks."
The scoring criteria were examined with a view to applicability to each building type of subject buildings through keeping the system simple with criteria as standardized as possible. The scoring criteria for each assessment item are based on the approaches below.

1) Assessment on a five-level scale, 1 to 5 with 3 as the standard grade.
2) As a general rule, Level 1 is earned for satisfying the Building Standard Law and other minimum necessary conditions, and a building at what is judged to be a general, ordinary level earns Level 3.
3) The ordinary level (level 3) is a level corresponding to ordinary technical and social levels at the time of assessment.
4) If there are points for which scoring criteria differ in line with other conditions that should be considered, such as special regional characteristics, multiple scoring criteria are provided.

2.3 Outline of the Assessment System

(1) Scoring
The assessment items included in Q (building environmental quality and performance) and L (building environmental loadings) should be scored according to the scoring criteria set for each (level 1~5). The points for each item are assigned as one point for level one to five points for level five.
For apartments, hotels and hospitals (classified as “residential”), the assessment is subdivided between Residential and Accommodation Sections and all other sections (Entire Building and Common Properties). Different scoring criteria are applied for the Residential and Accommodation Sections and the Entire Building and Common Properties, depending on the assessment items. In order to gain the assessment result for the building as a whole, calculate an aggregated average of the scores for each item, according to the ratio of floor areas for each section.

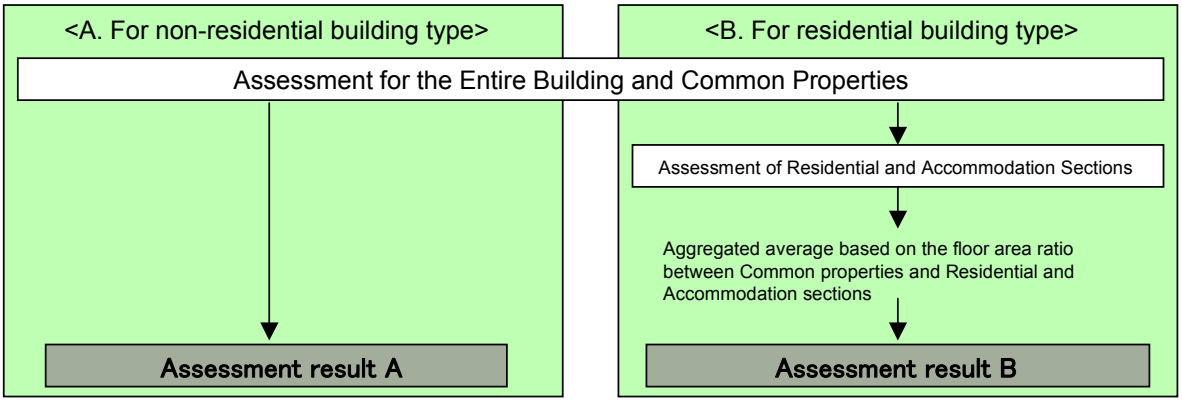


Figure 2.1 Building assessment system including buildings for “residential” and “non-residential”

(2) Assessment result

Assessment results are collated in two forms, the Score Sheet and the Assessment Results Sheet.
First of all, the results of the scoring sheet are tabulated on the score sheet. These are weighted using weighting coefficient for each assessment item to produce overall scores S_{Q1}~S_{Q3} and S_{LR1}~S_{LR3}, specific to fields Q-1~Q-3 and LR-1~LR-3. S_Q and S_{LR} are also calculated as scores for Q and LR.

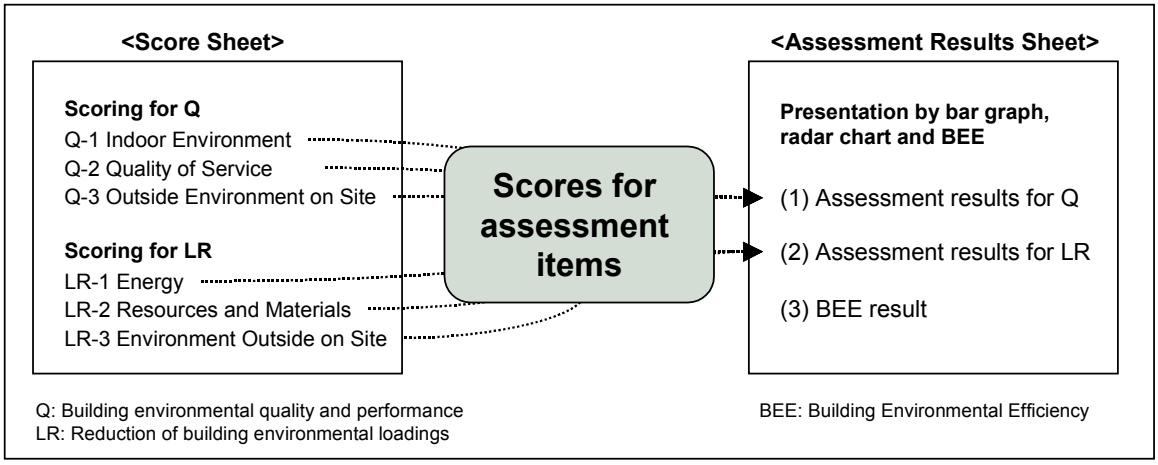


Figure. 2.2 Basic configuration of CASBEE

The Assessment Results Sheet presents assessment results for each field as radar charts, bar graphs and numerical data for Q (environmental quality and performance of the building) and LR (the building's load reduction). The BEE (Building Environmental Efficiency) result is also presented numerically and graphically, giving a multi-faceted and comprehensive grasp of the environmental characteristics of the evaluated building. BEE is calculated from S_Q and S_{LR}, the scores for Q and LR, according to the formula below.

$$BEE = \frac{\text{Q: Building environmental quality and performance}}{\text{L: Building environmental loadings}} = \frac{25 \times (S_Q - 1)}{25 \times (5 - S_{LR})} \quad (1)$$

The graph points are plotted with Q values on the Y axis and L values on the X axis to determine the Building Environmental Efficiency position, which enables Building Environmental Efficiency ranking on five classes from S down to C. (Refer to Part III for the details.)

2.4 Assessment of Building Complex

The assessment for buildings which combine two or more building types is calculated as a weighted average of assessment results for each type of the building, according to the ratio of floor areas for each type. The scores for the building complex are calculated using the equation below, using the ratio between floor areas for each type.

$$\text{Score for building complex} = \Sigma\ (\text{score for each building type} \times \text{corresponding floor ratio}) \quad (2)$$

This equation can also be applied to buildings complex for differing types on a single site, in the same way as to a single building complex.

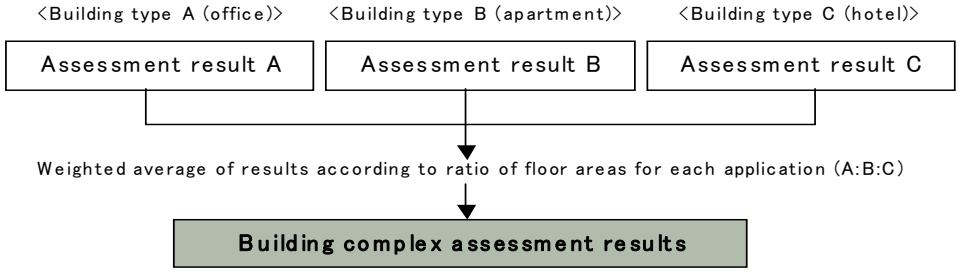


Figure 2.3 Assessment methods for building complex (for a building combining three types)

2.5 Assessment Items

Q: Environmental quality and performance of the building

In a building such as that shown in table 2.2, CASBEE takes the environmental quality and performance of the building as quality and performance related to improving living amenity for users, and evaluates each item.

Table 2.2 Assessment items included in building environmental quality and performance

Q-1. Indoor Environment	1. Noise & Acoustics	1.1 Noise
		1.2 Sound insulation
		1.3 Sound absorption
	2. Thermal Comfort	2.1 Room temperature control
		2.2 Humidity control
		2.3 Type of air conditioning system
	3. Lighting & Illumination	3.1 Daylighting
		3.2 Anti-glare measures
		3.3 Illuminance level
		3.4 Lighting controllability
	4. Air Quality	4.1 Source control
		4.2 Ventilation
		4.3 Operation plan
Q-2. Quality of Service	1. Service Ability	1.1 Functionality & usability
		1.2 Amenity
	2. Durability & Reliability	2.1 Earthquake-resistance
		2.2 Service life of components
		2.3 Reliability
	3. Flexibility & Adaptability	3.1 Spatial margin
		3.2 Floor load margin
		3.3 Adaptability of facilities
Q-3. Outdoor Environment on Site	1. Preservation & Creation of Biotope	
	2. Townscape & Landscape	
	3. Local Characteristics & Outdoor Amenity	3.1 Attention to local character and improvement of comfort
		3.2 Improvement of the thermal environment on site

Q-1 Indoor Environment

Research into the performance of indoor environments began before global environmental problems rose to prominence, and it already has a strong record and body of knowledge. POEM-O (Post Occupancy Evaluation Method Office) is one example. However, those evaluation methods aimed to evaluate performance after

completion of the building, or during its operation life. In contrast, this “CASBEE for New Construction” has developed the indoor environment assessment methods previously used in the construction and environmental engineering fields. The aim was to make it as easy as possible to evaluate target values for performance (heat, illuminance and noise values etc.) at the design and construction stages. In that process, aspects such as systems for operation, management, monitoring and control are evaluated as efforts to improve environmental performance. Many assessment items concerning materials that pollute indoor area were incorporated, reflecting the level of related concern and social need in recent years.

● 1. Noise & Acoustics

Evaluates the background noise level in connection with comfort and ease of working, but the assessment extends to equipment noise countermeasures for air conditioning and other services, sound insulation to prevent noise from reaching interiors, and sound absorption to stop reverberation of sound that penetrates the room.

● 2. Thermal Comfort

Evaluates the setting, control and maintenance management systems for interior temperature, humidity and air conditioning, and the related equipment.

● 3. Lighting

Evaluates efficient daylight use through openings and equipment, glare countermeasures for direct sunlight use, and lighting control based on desktop illuminance.

● 4. Air Quality

Evaluates the level of consideration given to selection of materials to maintain safe indoor air quality (IAQ), ventilation methods, construction methods and other aspects. This assessment item comprises three elements, Source Control, mainly avoidance of pollution-generating materials, Ventilation Rate, with the aim of expelling released contaminants, and Operation Plan.

Q-2 Quality of Service

Assessment of service functions to the users and owners of a building covers functional aspects that impact users' activities within the building, and others that are necessary for keeping the building itself in good condition in the long term.

● 1. Service Ability

Evaluates ease of movement and comfort. It is not easy to express such aspects as direct quantitative indices, so this assessment uses substitute indices such as floor area per occupant, ceiling height, adaptation to IT equipment, and availability of refreshment space. This assessment of functionality is an unprecedented characteristic, developed from the assessment of spatial elements under POEM-O. In contrast to POEM-O, which emphasized users' psychological reactions, this assessment mainly considers the physical performance of the indoor environment.

● 2. Durability & Reliability

Evaluates the ability to keep on using the building in good condition. This assessment considers not only the safety of the building itself against earthquakes, but efforts to address matters such as earthquake resistance and seismic isolation that enhance the safety of interior and exterior finishes, equipment and users, the reliability of emergency systems and the durability (service life extension) of interior and exterior finishes and equipment.

● 3. Flexibility & Adaptability

Evaluates readiness for long-term use, including future renewals and changes of usage, in terms of the substitute functions allowance for load and allowance for space. Spatial Margin focuses on two aspects, allowance for story height and adaptability of floor layout evaluates consideration given to renewal of building facilities in construction planning and equipment planning.

Q-3 Outdoor Environment on Site

Q-3 evaluates improvement of the environmental quality and performance of the outdoor environment on site and its surroundings, derived from efforts within the building and within the site. It comprises “Preservation & Creation of Biotope,” “Townscape & Landscape” and “Local Characteristics & Outdoor Amenity.” The assessment items include many qualitative factors. However, there is no assessment from the perspective of aesthetic and design characteristics. As it is difficult to quantify as a specific assessment method, scores are assigned in a self-assessment matrix method by selecting the level of each type of effort (high, low, none) from a table.

● 1. Preservation & Creation of Biotope

Evaluate efforts to conserve and create biotope for wild organisms. After initial construction, trees and other plants will not be grown fully, so evaluate the potential of the habitat created to support the lives of plants and animals.

● 2. Townscape & Landscape

Evaluate how well urban context and scenery have been considered. There are now many moves by national and regional governments to place legal regulations on scenery. This assessment should examine the level of consideration that has been given to rules for the urban context and scenery.

● 3. Local Characteristics & Outdoor Amenity

Make a wide-ranging assessment of consideration for carrying on local topography and culture and keeping appropriate relations with the community, and of efforts to increase comfort on and around the site. Also evaluate efforts to improve the thermal environment on the site, as steps towards alleviating the heat island effect. (Heat island measures to relieve the impact on areas outside the site are evaluated under “LR-3 ●5 Heat Island Effect.”

LR: Reduction of Building Environmental Loadings

The aspects of reduction of building environmental loadings that are considered by CASBEE are largely narrowed down to energy consumption, resource consumption and adverse impact on the off-site environment (pollution etc.), as shown in table 2.3 below, and evaluate each of these items.

Table 2.3 Assessment Items in Reduction of Building Environmental Loadings (LR)

LR-1. Energy	1. Building thermal load	
	2. Natural energy utilization	2.1 Direct use of natural energy
		2.2 Converted use of renewable energy
	3. Efficiency in building service system	3.1 HVAC system
		3.2 Ventilation system
		3.3 Lighting system
		3.4 Hot water supply system
		3.5 Elevators
		3.6 Equipment for improving energy efficiency
	4. Efficient operation	4.1 Monitoring
		4.2 Operational management system
LR-2. Resources & Materials	1. Water resources	1.1 Water saving
		1.2 Rainwater & gray water
	2. Materials of low environmental load	2.1 Recycled materials
		2.2 Timber for sustainable forestry
		2.3 Materials with low health risks
		2.4 Reuse of existing building structure, etc.
		2.5 Reusability of components and materials
		2.6 Use of CFCs and halons
LR-3. Off-site Environment	1. Air pollution	
	2. Noise, vibration & odor	2.1 Noise & vibration
		2.2 Odors
	3. Wind damage & sunlight obstruction	
	4. Light pollution	
	5. Heat island effect	
	6.Load on local infrastructure	

LR-1 Energy

Efforts to reduce the energy load caused by the operation of the building are classified into LR-1-1 Building Thermal Load, LR-1-2 Natural Energy Utilization, LR-1-3 Efficiency in Building Service System and LR-1-4 Efficient Operation, which are all evaluated. In Japan, building energy saving standards have been laid down since 1980 on the basis of Energy Saving Law. Those standards have used two numerical indicators, PAL and CEC (performance standards), and more recently the Point Method (specification standards) has also been used. There has also been a need in recent years for energy-saving measures from new perspectives, such as the aggressive use of natural energy and unutilized renewable energy, the introduction of BEMS and efficiency optimization of building operation. Therefore CASBEE provides a new and clear assessment frame that covers such measures. The indicators mentioned above are used for assessment of general buildings, with the exception of apartments. Following the directive of April 2003, the energy-saving standards are to be applied to buildings for all types, making it possible to carry out assessments according to the building types stipulated in the standard.

● 1. Building Thermal Load

Uses PAL value and point value to evaluate the improvements in performance of building envelope in the architectural plan, which are closely related to reductions in air conditioning energy consumption.

● 2. Natural Energy Utilization

Evaluates efforts for direct use of natural energy (light and ventilation etc.) and converted use of renewable energy (solar generation, heat use etc.).

● 3. Efficiency in Building Service System

Uses ERR values, calculated from CEC, and Point values for various equipment to evaluate the level of efficiency improvement in air conditioning, ventilation, lighting, hot water supply, elevators.

● 4. Efficient Operation

Evaluates the operation and maintenance system and whether there is an energy consumption monitoring system in running since the building went into operation.

For the assessment of apartments, there is an assessment frame with scoring standard that conforms with grading system that are used under the Housing Performance Indication System of the Housing Quality Assurance Law. However, the Housing Performance Indication System only evaluates LR-1-1 Building Thermal Load, while CASBEE goes further to include LR-1-2 Natural Energy Utilization and LR-1-3 Efficiency in Building Service System in the assessment. LR-1-3 Efficiency in Building Service System only considers built-in equipment in the building, which can be evaluated even at the design stage, and is further limited to water heating equipment, which accounts for a high proportion of energy consumption. For apartments, LR-1-4 Efficient Operation is excluded from consideration because, in comparison with commercial and business facilities, there are fewer aspects where the management of the building can contribute.

LR-2 Resources & Materials

In this section, LR-2-1 Water Resources and LR-2-2 Materials of Low Environmental Load are evaluated as ways of reducing the consumption of resources and materials through the life cycle of the building. Various methods using existing environmental performance assessment tools are employed for evaluating the environmental load generated by the use of resources in buildings. However, they have their own assessment indices and no common standard method has been established. Therefore the development of CASBEE collated and analyzed the assessment indicators used by existing Japanese and foreign assessment tools in connection with the use of resources in buildings. The CASBEE assessment items were based on that analysis, so that the concepts are incorporated in a new group of assessment indicators that avoids redundancy.

● 1. Water Resources

Evaluates whether or not efforts are made to save water, use rainwater and reuse gray water.

● 2. Materials of Low Environmental Load

Looks beyond reduction of resource consumption at the construction stage (use of recycled materials, reuse

of structural members etc.) to make a broader assessment of the level of efforts for reducing environmental loads associated with construction and equipment materials. These efforts include sustainable forestry (timber from sustainable forestry), prevention of health damage to users, and protection of the ozone layer (avoidance of materials such as CFCs and halons).

LR-2 also indirectly evaluates the extent to which emissions of CO_2 and other greenhouse gases have been reduced at the phase of manufacturing the construction materials to be used.

LR-3 Off-site Environment

LR-3 Off-site Environment evaluates the efforts to reduce the impact that environmental loads generated in the building and its site give the surrounding area and beyond site boundaries. The assessment also extends to measures to limit the heat island effect, which is a problem in urban areas, and to reduce the load placed on local infrastructure (rainwater runoff limitation, waste water treatment, transport, waste disposal load etc.), which is an indirect environmental load on the local area.
Rather than quantifying the environmental load, this assessment examines efforts and measures towards reducing that load. The specific assessment method, which is the same as for Q-3 Outdoor Environment on Site is that scores are assigned in a self-assessment matrix method by selecting the level of each type of effort (high, low, none) from a table.

● 1. Air Pollution

Evaluates efforts to restrict the quantity of atmospheric pollutants generated within the building or its site. The assessment only considers measures taken to restrict the emission of atmospheric pollutants from operation of building and efforts made to remove the atmospheric pollutants using plants.

● 2. Noise, Vibration & Odor

Evaluate the noise, vibration and odor generated by the operation of the building. Evaluate according to whether or not there are any measures against the generation or transmission of noise and vibration originating in the operation of building equipment. For offensive odors, consider the chemical substances specified in the Offensive Odor Control Law, and measures used to reduce odor from organic garbage and similar sources.

● 3. Wind Damage

For large-scale buildings, which are expected to cause wind hazards, such hazards must be given thorough consideration at the design stage. For this assessment, consider whether or not any measures have been planned to reduce wind hazards for a building which is expected to generate such hazards. Also evaluate measures taken to minimize the impact of sunlight obstruction on adjacent buildings and the surrounding area.

● 4. Light Pollution

Light pollution is a major problem, which is concentrated mainly in urban areas. Sources include building exterior lighting and advertising displays, light leakage from building interiors, and reflected solar glare from building walls. Measures to reduce this light pollution are evaluated under this item.

● 5. Heat Island Effect

Evaluate measures which contribute to alleviation of the heat island effect outside the site. Consider airflow leaving the site, planting of vegetation on and around the building, reduction of solar absorption rate and reduction of artifitial waste heat.
Evaluate on-site alleviation of the heat island effect under “Q-3 ●3.2 Improvement of the Thermal Environment on Site.”

● 6. Load on Local Infrastructure

Evaluate measures to reduce the loads imposed on local infrastructure facilities by the operation of the building. The four elements to consider are rainwater flow suppression, sewage load suppression, traffic processing load suppression and garbage processing load suppression.

2.6 Weighting Coefficients

The weighting coefficients between assessment fields should not just be determined from scientific knowledge. They should also take into account the values and perceptions of various interested parties, such as designers, building owners and managers and related officials. For the 2003 edition, the weighting coefficients were determined by votes and case studies by the experts of the CASBEE Research and Development Committee. In the development of the 2004 edition, which includes factories as a new building type, the CASBEE developers conducted a wide-ranging questionnaire survey of the designers, building owners and operators, related officials and others who would actually use the system (110 valid samples were received). Pair comparison judgments based on the responses were used in a hierarchical process to judge the importance of multiple items by an Analytic Hierarchy Process (AHP). The revised weighting coefficients are as shown in Table 2.4. Different weighting coefficients for detailed assessment levels are set for individual buildings, as appropriate for their types.

Table 2.4 Weighting Coefficients

Assessment Fields	Non-factory	Factory
Q-1 Indoor Environment	0.40	0.30
Q-2 Quality of Service	0.30	0.30
Q-3 Outdoor Environment on Site	0.30	0.40
LR-1 Energy	0.40	
LR-2 Resources & Materials	0.30	
LR-3 Off-site Environment	0.30	

NOTE) The revisions of weighting coefficients between the 2003 and 2004 editions are as stated below. Among those coefficients, Q-3 has been increased relative to Q-1 and Q-2 for Q (Building environmental quality and performance), while LR-3 has been increased relative to LR-1 and LR-2 for LR (Reduction of building Environmental loadings).

Q-1（0.50→0.40）, Q-2（0.35→0.30）, Q-3（0.15→0.30） non-factory
LR-1（0.50→0.40）, LR-2（0.30→0.30）, LR-3（0.20→0.30）

3. Assessment Procedure

3.1 Composition of the Assessment Tool

"CASBEE for New Construction" has been developed to allow simple data entry from general-purpose spreadsheet software for various usage of assessment result. Furthermore, scoring can be carried out using the same software, regardless of differences in building type. At that stage, there are the Main Sheet and Score Entry Sheet for data entry and the Score Sheet and Assessment Results Sheet for output. The basic information on the building (building type, floor area etc.), necessary for assessment, is entered on the Main Sheet. The scoring criteria for the building under assessment are presented on the Score Entry Sheet, and the scoring results for each assessment item are input with reference to the criteria.

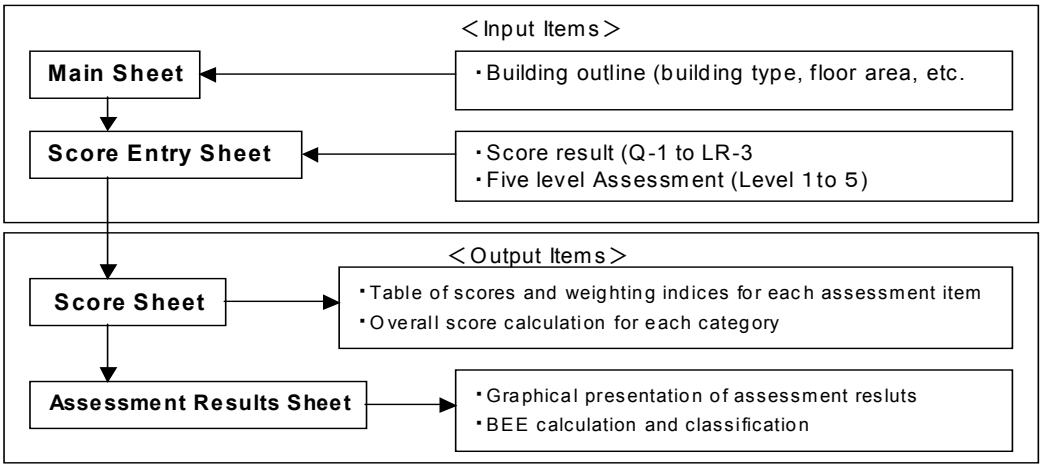


Figure 3.1 Overall Configuration of the Scoring Software

3.2 Main Sheet

The main sheet is the sheet where the assessor makes the first input. Enter the information necessary for the assessment, such as basic information on the subject building (name, type, size etc.). Figure 3.2 shows the main sheet. For the assessment of buildings with residential type buildings, enter the floor area ratio between "Entire Building and Common Properties" and "Residential and Accommodation Section."

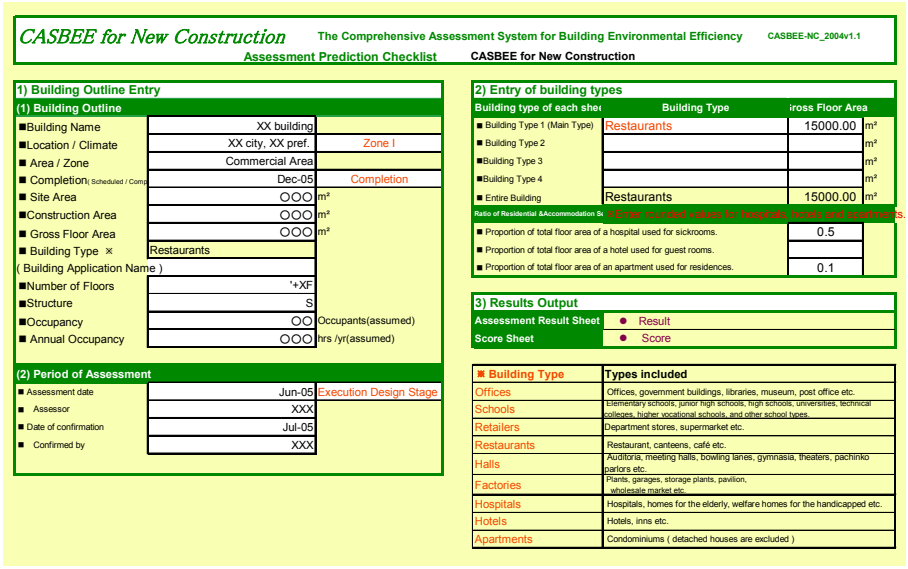


Figure 3.2 Main Sheet screen (data entry example)

Enter the basic information necessary for the assessment here. Fill out the (i) building outline, (ii) period of assessment and (iii) ratio of Residential and Accommodation Sections here. The data entered here, specific weighting coefficients for each assessment stage and etc., are referred to and presented on each Score Entry Sheet and the Score Sheet.

1) Building outline entry

a. Building outline

Enter the basic information of the building necessary for the assessment (name, type, scale, etc.). This information will be transferred to the Assessment Results Sheet.

b. Period of assessment

Enter the assessment date.

Table 3.1 Input items and examples

Entry item	Example	Entry item	Example
Building Name	XX Building	Total floor area	X,XX0
Location/ Climate	XX city, XX pref.	Building type	Office, school, apartment
Area/ Zone	Commercial area	（Building type）	City hall, college
Regional Category	Area CategoryⅤ※	Number of floor	+XXF
Completion	2003.01	Structure	S
Site Area	X,XX0	Average occupancy	X,XX0
Construction Area	X,XX0	Annual occupancy time (in hours)	X,XX0

*In the regional category section, choose from zones I - VI in appendix table 1[1] of the "The Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Housing."

2) Entry for individual building types

a. Select the most applicable building type name from those listed in Table 3.2. This assessment software can carry out compound assessment for up to four types at the same time. To evaluate a building with a single building type, enter the type and the total floor area in the “Main type” column. For a building with compound types, enter the floor areas for each type. Use “1” Summary entry (building type) to enter a more specific type for the building concerned.

b. Ratio of Residential and Accommodation Sections

Enter the floor area ratio of “Entire Building and Common Properties” and “Residential and Accommodation Section when evaluating residential type building. (Do not enter the ratio for non-residential type building.)

[1] Notification No.2 (Mar. 30th, 1999) of the (former) Ministry of International Trade and Industry and the (former) Ministry of Construction of Japan.

Table 3.2 Building type and classification

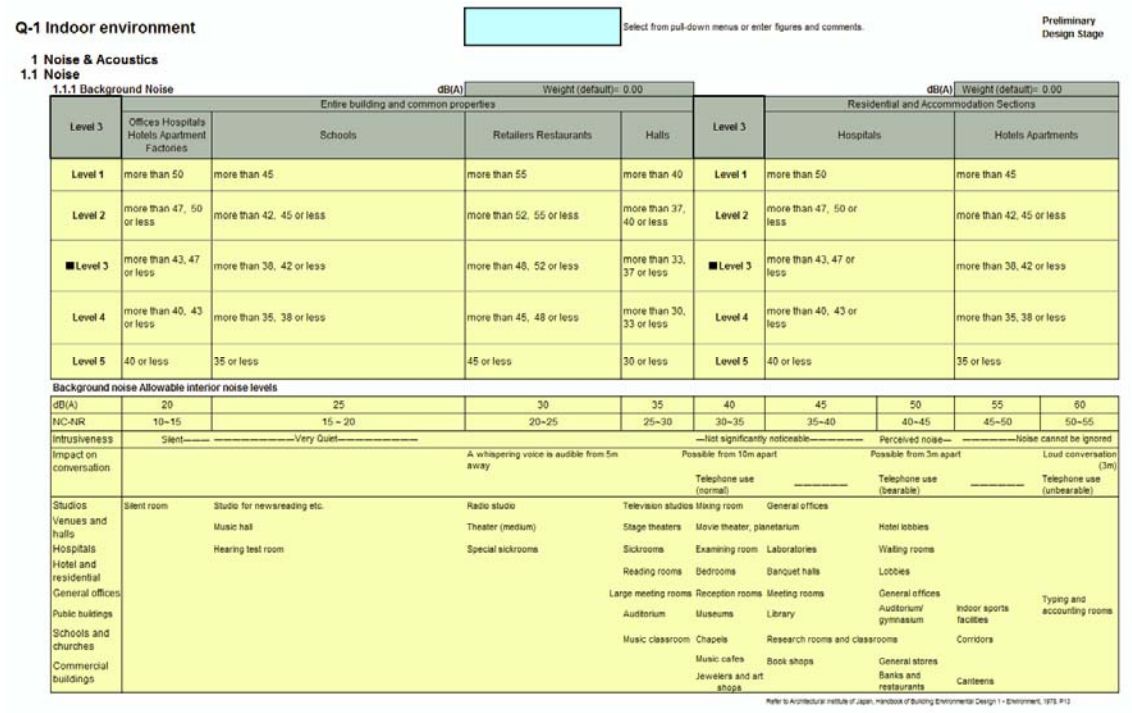
Classification	Building type	Types included
Non-residential type	Offices	Offices, government buildings, libraries, museums, post offices etc.
	Schools	Elementary schools, junior high schools, high schools, universities, technical colleges, higher vocational school and other school types
	Retailers	Department stores, supermarkets etc.
	Restaurants	Restaurants, canteens, cafes etc.
	Halls	Auditoria, halls, bowling lanes, gymnasia, theaters, movie theaters, pachinko parlor etc.
	Factories	Factories (exclude manufacturing area), garage, warehouse, the stands, wholesale market etc.
Residential type	Hospitals	Hospitals, homes for elderly, welfare homes for the handicapped etc.
	Hotels	Hotels, inns etc.
	Apartments	Apartments (dwellings are not applied)

3) Results output

The output sheets which summarize each input results can be called to the screen by selecting the Assessment Results Sheet and the Score Sheet on the Main Sheet “3).”

3.3 Score Entry Sheet

The Score Entry Sheets are the sheets for the assessor to enter scores according to the scoring criteria set for each sheet (level 1~5). The sheets are prepared for each assessment categories.



Q-1 Indoor environment

Select from pull-down menus or enter figures and comments.

Preliminary Design Stage

1 Noise & Acoustics

1.1 Noise

1.1.1 Background Noise dB(A) Weight (default)= 0.00

Level 3	Entire building and common properties: Offices Hospitals Hotels Apartment Factories	Schools	Retailers Restaurants	Halls
Level 1	more than 50	more than 45	more than 55	more than 40
Level 2	more than 47, 50 or less	more than 42, 45 or less	more than 52, 55 or less	more than 37, 40 or less
■Level 3	more than 43, 47 or less	more than 38, 42 or less	more than 48, 52 or less	more than 33, 37 or less
Level 4	more than 40, 43 or less	more than 35, 38 or less	more than 45, 48 or less	more than 30, 33 or less
Level 5	40 or less	35 or less	45 or less	30 or less

dB(A) Weight (default)= 0.00

Level 3	Residential and Accommodation Sections: Hospitals	Hotels Apartments
Level 1	more than 50	more than 45
Level 2	more than 47, 50 or less	more than 42, 45 or less
■Level 3	more than 43, 47 or less	more than 38, 42 or less
Level 4	more than 40, 43 or less	more than 35, 38 or less
Level 5	40 or less	35 or less

Background noise Allowable interior noise levels

dB(A)	20	25	30	35	40	45	50	55	60
NC-NR	10~15	15 ~ 20	20~25	25~30	30~35	35~40	40~45	45~50	50~55
Intrusiveness	Silent———	——————Very Quiet———————			---Not significantly noticeable---———		Perceived noise---	———Noise cannot be ignored	
Impact on conversation			A whispering voice is audible from 5m away		Possible from 10m apart Telephone use (normal)	———	Possible from 3m apart Telephone use (bearable)	———	Loud conversation (3m) Telephone use (unbearable)
Studios	Silent room	Studio for newsreading etc.	Radio studio	Television studios	Mixing room	General offices			
Venues and halls		Music hall	Theater (medium)	Stage theaters	Movie theater, planetarium		Hotel lobbies		
Hospitals		Hearing test room	Special sickrooms	Sickrooms	Examining room	Laboratories	Waiting rooms		
Hotel and residential				Reading rooms	Bedrooms	Banquet halls	Lobbies		
General offices				Large meeting rooms	Reception rooms	Meeting rooms	General offices		Typing and accounting rooms
Public buildings				Auditorium	Museums	Library	Auditorium/ gymnasium	Indoor sports facilities	
Schools and churches				Music classroom	Chapels	Research rooms and classrooms		Corridors	
Commercial buildings					Music cafes	Book shops	General stores		
					Jewelers and art shops		Banks and restaurants	Canteens	

Refer to Architectural Institute of Japan, Handbook of Building Environmental Design 1 - Environment, 1978, P13

Figure 3.3 Score Entry Sheet

1) Scoring Criteria

As shown in figure 3.3, Score Entry Sheets display lists of scoring criteria for each building type, and the assessor should assign points accordingly. “Entire Building and Common Properties” should be scored for all types in common. However, for residential buildings, the score entry sheets for Q-1 and Q-2 have scoring criteria and assessment columns for Residential and Accommodation Sections, and those should be used for scoring.

Scoring criteria are set for levels 1~5, and the number for the level (e.g. “3” for level 3) should be chosen from the pull-down menu in the assessment column. In cases where the scoring criteria cannot be applied as they stand because of individual conditions set for the evaluated building, some scoring items can be excluded from the assessment. In such cases, the excluded scoring items are assigned a weighting of "0" unless specified otherwise, and distributed according to the weighting of other scoring items.

Table 3.3 Main elements in Score Entry Sheet

Element	Description
Scoring	Choose level 1~5 from pull-down menu.
Weighting coefficients (standard)	Coefficient set by building type
Scoring criteria	Display assessment criteria (level 1~5).
Efforts to be evaluated	A checklist or list of methods of points to be considered in the Design for Environment

2) Efforts to be evaluated

Under some scoring items, particularly Q-3 Outdoor Environment on Site and LR-3 Off-site Environment, levels are set for the efforts listed in the table of "Efforts to be evaluated" under the table of scoring criteria. This information is listed under Efforts to be evaluated, as a checklist of points to be considered in the Design for Environment process, or as a list of methods. The levels of the individual efforts in the list are evaluated by selecting the level/ existence of each type of effort (high, low, none), with the credits assigned for each level, or for the number of items, collated in a matrix.

Q-3 Outdoor Environment on Site Select from pull-down menus or enter figures and comments. **Preliminary Design Stage**

1 Preservation & Creation of Biotope Weight (default)= 0.30

Level 3	Offices Schools Retailers Restaurants Halls Hospitals Hotels Apartments Factories
Level 1	On the Efforts to be evaluated , 0<= Credit Ratio (3) <0.2
Level 2	On the Efforts to be evaluated , 0.2<= Credit Ratio (3)<0.4
■Level 3	On the Efforts to be evaluated , 0.4<= Credit Ratio (3) <0.6
Level 4	On the Efforts to be evaluated , 0.6<= Credit Ratio (3)<0.8
Level 5	On the Efforts to be evaluated , 0.8<= Credit Ratio (3)

Efforts to be evaluated

Credits	Level of efforts			Efforts
	High	Low	None	
2	2	1	0	I) A survey has been made of surrounding habitat (state of inhabiting flora and fauna, etc.)
2	2	1	0	II) Conservation of existing ecological resources Conservation of existing topography, topsoil, trees, bodies of water etc.
				III) Extensive greening
2	2	1	0	1) Thorough greening of exterior (surface) on site
2	2	1	0	2) Greening the building (roofs and walls)
0	2	1	0	3) Landscaping of green space Placement of continuous green land and voluminous vegetation to form ecological networks in the local area.
0	2	1	0	4) Consideration for habitat for small animals Planting of feed trees, biotopes and bird sanctuaries, use of porous materials etc.
0	2	1	0	IV) Preparation of monitoring plan and management of flora and fauna habitat
0	2	1	0	V) Efforts to improve contacts between users and animals (Creation of water parks and other contact spaces, provision of information on related measures, etc.).
Excluded	2	1	-	VI) Others ( )

(1) Total Credits= **8 Credits** (2) Maximum Credits = **16 Credits** (3) Credits Ratio ((1) / (2)) = **0.50**

Figure 3.4 Score Entry Sheet (matrix)

3) LR-1 Energy

Under LR-1 Energy, ERR assessment is used for buildings other than apartments, which are evaluated individually on the basis of their specifications, or by their grade under the Housing Quality Assurance Law. The system used for assessment here is to transfer figures from the Planning Documents for Energy Conservation Approval or the Housing Performance Assessment and evaluate “1. Building Thermal Load” and “3. Efficiency in Building Service System.”

4) Scoring for building complex

To evaluate building complex, for all items other than LR-1 Energy, the assessor should manually prepare and enter a weighted average of the levels (points) for each building type, weighted for the relative floor areas of each.

To evaluate LR-1 Energy, there is a column to transfer figures from the Planning Documents for Energy Conservation Approval or the Housing Performance Assessment, so for “1. Building Thermal Load Control” and “3. Equipment and System Efficiency Enhancement” in (3) above, a weighted average of the levels (points) is automatically prepared for each of the building type, weighted for the relative floor areas of each.

LR-1 Energy Select from pull-down menus or enter figures and comments. Preliminary Design Stage

Select Assessment standard type, and Transfer the necessary entries from the report of "Energy-saving plan"&"the Housing Performance Assessment"

	Building Type	Offices			
	Floor area for each building type	15,000 m²			
Building plan	For each assessment standard type	PAL Value	PAL Value	PAL Value	PAL Value
	PAL value, Point value, Insulation class	300.0 MJ/m²/y	300.0	340.0	420.0
	The standard for judgment by owner	300 MJ/m²/y			
HVAC system	For each assessment standard type	CEC/AC Value	CEC/AC Value	CEC/AC Value	CEC/AC Value
	CEC/AC value, Point value	1.5 (-)	1.5	1.5	1.5
	Annual Hypothetical Air Conditioning Load or correction point	150 MJ/y	150	150	150
	The standard for judgment by owner	1.5 (-)			
Ventilation System	For each assessment standard type	CEC/V Value	CEC/V Value	CEC/V Value	CEC/V Value
	CEC/V value, Point value	1.0 (-)	1.0	1.0	1.0
	Hypothetical energy consumption for ventilation per year	150 MJ/y	150	150	150
	The standard for judgment by owner	1.0 (-)			
Lighting System	For each assessment standard type	CEC/L Value	CEC/L Value	CEC/L Value	CEC/L Value
	CEC/L value, Point value	1.0 (-)	1.0	1.0	1.0
	Hypothetical energy consumption for lighting per year	150 MJ/y	150	150	150
	The standard for judgment by owner	1.0 (-)			
Hot Water Supply System	For each assessment standard type	CEC/HW Value	CEC/HW Value	CEC/HW Value	CEC/HW Value
	CEC/HW value,Point value,	1.7 (-)	1.7	1.7	1.7
	Hypothetical hot water supply load per year	300 MJ/y	300	300	300
	Ix value	15 m/(m3/day)	15	15	15
	The standard for judgment by owner	1.7 (-)			
Elevators	For each assessment standard type	CEC/EV Value	CEC/EV Value	CEC/EV Value	CEC/EV Value
	CEC/EV value, Point value	1.0 (-)	1.0	1.0	1.0
	Hypothetical energy consumption for elevator per year	1,000,000 MJ/y	1,000,000	1,000,000	1,000,000
	The standard for judgment by owner	1.0 (-)			
Equipment of enhanced energy usage efficiency (*)	Annual Energy Saving Volume Using Efficient Equipment	0 MJ/y	0 MJ/y	0 MJ/y	0 MJ/y
	Annual Energy Saving for the Entire Building	8,000,000 MJ/y	8,000,000 MJ/y	8,000,000 MJ/y	8,000,000 MJ/y
	Energy Saving rate K value	0.00	0.00	0.00	0.00
ERR	Choice of method	Assessment by ERR	Method other than ERR	Method other than ERR	Method other than ERR
	Rate of reduction in primary energy consumption ERR	0.0%	Excluded	Excluded	Excluded

*) Such as solar energy generation system and cogeneration system

Figure 3.5 Score Entry Sheet (Assessment of building complex at LR-1 Energy)

3.4 Score Sheet

The Score Sheet tabulates the scoring results from the score entry sheets. The assessment score for each scoring item are multiplied by their weighting coefficients and added in sequence to produce S_{Q1}~S_{Q3}, S_{LR1}~S_{LR3} (the overall score by categories in the Q-1 to Q-3, LR-1 to LR-3 SQ), S_Q (the overall score in the Q assessment category) and S_{LR} (the overall score in the LR assessment category). If the building under assessment is a residential type building, the Score Sheet presents score results for Entire Building and Common Properties and for Residential and Accommodation Sections in parallel. The results are calculated as a weighted average according to the ratio of floor areas for each section to produce a score for the building as a whole. The score weighted on a pro-rata basis entered in ratio of Residential and Accommodation Section under 2) building outline entry on the Main Sheet are displayed in the “Total” column as the final score for the evaluated building.
For the assessment items over 3 point (level 3), practical efforts to be evaluated are described in “Summary of Design for Environment” column.

CASBEE-NCe_2005v1.0

CASBEE for New Construction

XX building

(4) Score Sheet **Preliminary Design Stage**

Concerned categories			Brief summary of Design for Environment	Entire Building and Common Properties		Residential and Accomodation sections		Total
				Score	weighting coefficients	Score	weighting coefficients	
Q Building Environmental Quality & Performance								**3.0**
Q-1 Indoor Environment					0.40			**3.0**
1 Noise & Acoustics				**3.0**	0.15	-	-	**3.0**
1.1 Noise				-	-	-	-	
	1	Background noise		3.0	-	3.0	-	
	2	Equipment noise		-	-	-	-	
1.2 Sound Insulation				**3.0**	0.70	-	-	
	1	Sound Insulation of Openings		3.0	0.60	3.0	-	
	2	Sound Insulation of Partition Walls		3.0	0.40	3.0	-	
	3	Sound Insulation of Floor Slabs (light impact)		3.0	-	3.0	-	
	4	Sound Insulation of Floor Slabs (heavy impact)		3.0	-	3.0	-	
1.3 Sound Absorption				**3.0**	0.30	3.0	-	
2 Thermal Comfort				**3.0**	0.35	-	-	**3.0**
2.1 Room Temperature Control				**3.0**	0.50	-	-	
	1	Room Temperature Setting		3.0	0.30	3.0	-	
	2	Variable Loads & Following-up Control		3.0	-	-	-	
	3	Perimeter Performance		3.0	0.20	3.0	-	
	4	Zoned Control		3.0	0.50	-	-	
	5	Temperature & Humidity Control		3.0	-	3.0	-	
	6	Individual Control		3.0	-	-	-	
	7	Allowance for After-hours Air Conditioning		3.0	-	-	-	
	8	Monitoring Systems		4.0	-	-	-	
2.2 Humidity Control				**3.0**	0.20	3.0	-	
2.3 Type of Air Conditioning System				**3.0**	0.30	3.0	-	
3 Lighting & Illumination				**3.0**	0.25	-	-	**3.0**
3.1 Daylighting				**3.0**	0.30	-	-	
	1	Daylight Factor		3.0	0.60	3.0	-	
	2	Openings by Orientation		3.0	-	-	-	
	3	Daylight Devices		3.0	0.40	3.0	-	
3.2 Anti-glare Measures				**3.0**	0.30	-	-	
	1	Glare from light fixtures		3.0	-	3.0	-	
	2	Daylight control		3.0	1.00	3.0	-	
3.3 Illuminance Level				**3.0**	0.15	-	-	
	1	Illuminance		3.0	1.00	3.0	-	
	2	Uniformity Ratio of Illuminance		3.0	-	3.0	-	
3.4 Lighting Controllability				**3.0**	0.25	3.0	-	
4 Air Quality				**3.0**	0.25	-	-	**3.0**
4.1 Source Control				**3.0**	0.50	-	-	
	1	Chemical Pollutants		3.0	1.00	3.0	-	
	2	Mineral Fiber		3.0	-	3.0	-	
	3	Mites, Mold etc.		3.0	-	3.0	-	
	4	Legionella		3.0	-	3.0	-	
4.2 Ventilation				**3.0**	0.30	-	-	
	1	Ventilation Rate		3.0	0.33	3.0	-	
	2	Natural Ventilation Performance		3.0	0.33	3.0	-	
	3	Consideration for Outside Air Intake		3.0	0.33	3.0	-	
	4	Air Supply Planning		3.0	-	3.0	-	
4.3 Operation Plan				**3.0**	0.20	-	-	
	1	CO_2 Monitoring		3.0	0.50	-	-	
	2	Control of Smoking		3.0	0.50	-	-	
Q-2 Quality of Service					0.30			**3.0**
1 Service Ability				**3.0**	0.40	-	-	**3.0**
1.1 Functionality & Usability				**3.0**	0.60	-	-	
	1	Provision of Space & Storage		3.0	0.33	3.0	-	
	2	Adaptation of Building & Services to IT Innovation		3.0	0.33	-	-	
	3	Barrier-free Planning		3.0	0.33	-	-	
1.2 Amenity				**3.0**	0.40	-	-	
	1	Perceived Spaciousness & Access to View		3.0	0.33	3.0	-	
	2	Space for Refreshment		3.0	0.33	-	-	
	3	Décor Planning		3.0	0.33	3.0	-	
2 Durability & Reliability				**3.0**	0.31	-	-	**3.0**
2.1 Earthquake Resistance				**3.0**	0.48	-	-	
	1	Earthquake-resistance		3.0	0.80	-	-	
	2	Seismic Isolation & Vibration Damping Systems		3.0	0.20	-	-	
2.2 Service Life of Components				**3.0**	0.33	-	-	
	1	Necessary Refurbishment Interval for Exterior Finishes		3.0	0.29	-	-	
	2	Necessary Renewal Interval for Main Interior Finishes		3.0	0.11	-	-	
	3	Necessary Renewal Interval for Plumbing & Wiring Materials		3.0	0.29	-	-	
	4	Necessary Renewal Interval for Major Equipment & Services		3.0	0.29	-	-	
2.3 Reliability				**3.0**	0.19	-	-	
	1	HVAC System		3.0	0.20	-	-	
	2	Water Supply & Drainage		3.0	0.20	-	-	
	3	Electrical Equipment		3.0	0.20	-	-	
	4	Support Method of Machines & Ducts		3.0	0.20	-	-	
	5	Communications & IT equipment		3.0	0.20	-	-	

Figure 3.6 Score Sheet for CASBEE for New Construction (1/2)

3 Flexibility & Adaptability			3.0	0.28		-	3.0
3.1 Spatial Margin			3.0	0.31		-	
1	Allowance for Story Height		3.0	0.60	3.0	-	
2	Adaptability of Floor Layout		3.0	0.40	3.0	-	
3.2 Floor Load Margin			3.0	0.31	3.0	-	
3.3 Adaptability of Facilities			3.0	0.37	-	-	
1	Ease of Air Conditioning Duct Renewal		3.0	0.16	-	-	
2	Ease of Water Supply & Drain Pipe Renewal		3.0	0.16	-	-	
3	Ease of Electrical Wiring Renewal		3.0	0.11	-	-	
4	Ease of Communications Cable Renewal		3.0	0.11	-	-	
5	Ease of Equipment Renewal		3.0	0.22	-	-	
6	Provision of Backup Space		3.0	0.22	-	-	
Q-3 Outdoor Environment on Site				0.30			3.0
1 Preservation & Creation of Biotope			3.0	0.30	-	-	3.0
2 Townscape & Landscape			3.0	0.40	-	-	3.0
3 Local Characteristics & Outdoor Amenity			3.0	0.30	-	-	3.0
3.1 Attention to Local Character & Improvement of Comfort			3.0	0.50	-	-	
3.2 Improvement of the Thermal Environment on Site			3.0	0.50	-	-	
LR Reduction of Building Environmental Loadings							3.0
LR-1 Energy				0.40			3.0
1 Building Thermal Load			3.0	0.30	-	-	3.0
2 Natural Energy Utilization			3.0	0.20	-	-	3.0
2.1 Direct Use of Natural Energy			3.0	0.50	-	-	
2.2 Converted Use of Renewable Energy			3.0	0.50	-	-	
3 Efficiency in Building Service System			3.0	0.30	-	-	3.0
4 Efficient Operation			3.0	0.20	-	-	3.0
4.1 Monitoring			3.0	0.50	-	-	
4.2 Operational Management System			3.0	0.50	-	-	
LR-2 Resources & Materials				0.30			3.0
1 Water Resources			3.0	0.15	-	-	3.0
1.1 Water Saving			3.0	0.40	-	-	
1.2 Rainwater & Gray Water			3.0	0.60	-	-	
1	Rainwater Use Systems		3.0	0.66	-	-	
2	Gray Water Reuse System		3.0	0.33	-	-	
2 Materials of Low Environmental Load			3.0	0.85	-	-	3.0
2.1 Recycled Materials			3.0	0.35	-	-	
1	Reuse Efficiency of Materials Used in Structure		3.0	1.00	-	-	
2	Reuse Efficiency of Non-structural Materials		3.0	-	-	-	
2.2 Timber from Sustainable Forestry			3.0	0.03	-	-	
2.3 Materials with Low Health Risks			3.0	0.08	-	-	
2.4 Reuse of Existing Building Skeleton etc.			3.0	0.17	-	-	
2.5 Reusability of Components & Materials			3.0	0.17	-	-	
2.6 Use of CFCs & Halons			3.0	0.17	-	-	
1	Fire Retardant		3.0	0.33	-	-	
2	Insulation Materials		3.0	0.33	-	-	
3	Refrigerants		3.0	0.33	-	-	
LR-3 Off-site Environment				0.30			3.0
1 Air Pollution			3.0	0.15	-	-	3.0
2 Noise, Vibration & Odor			3.0	0.15	-	-	3.0
2.1 Noise & Vibration			3.0	0.50	-	-	
2.2 Odors			3.0	0.50	-	-	
3 Wind Damage & Sunlight Obstruction			3.0	0.15	-	-	3.0
4 Light Pollution			3.0	0.10	-	-	3.0
5 Heat island effect			3.0	0.30	-	-	3.0
6 Load on Local Infrastructure			3.0	0.15	-	-	3.0

■ LR-1 Score book for each building type		Offices	-	-	-	Overall score on pro-rata area
		15000 m²	-	-	-	
1 Building Thermal Load		3.0	-	-	-	3.0
3 Efficiency in Building Service System	Assessment by ERR	3.0	-	-	-	3.0
	Assessment by means other than ERR	-	-	-	-	
3.1 HVAC System		3.0	-	-	-	–
3.2 Ventilation System		3.0	-	-	-	–
3.3 Lighting System		3.0	-	-	-	–
3.4 Hot Water Supply System		3.0	-	-	-	–
3.5 Elevators		3.0	-	-	-	–

Figure 3.7 Score Sheet for CASBEE for New Construction (2/2)

3.5 Assessment Results Sheet

The Assessment Results Sheet gives scoring results of Q (Building environmental quality and performance), LR (Reduction of building environmental loadings) and BEE (Building Environmental Efficiency). The results are presented in graphical and numerical format. Figure 3.8 show the entire content of the sheet.

(1) Building outline

(2) CASBEE assessment results

(2)-1 Results display for each assessment category

- Rader charts

- Assessment results for Q

- Assessment results for LR

(2)-2 Assessment results for BEE (Q/L)

(3) Optional assessment items

(3)-1 Quantitative assessment indicators

(3)-2 Design process assessment

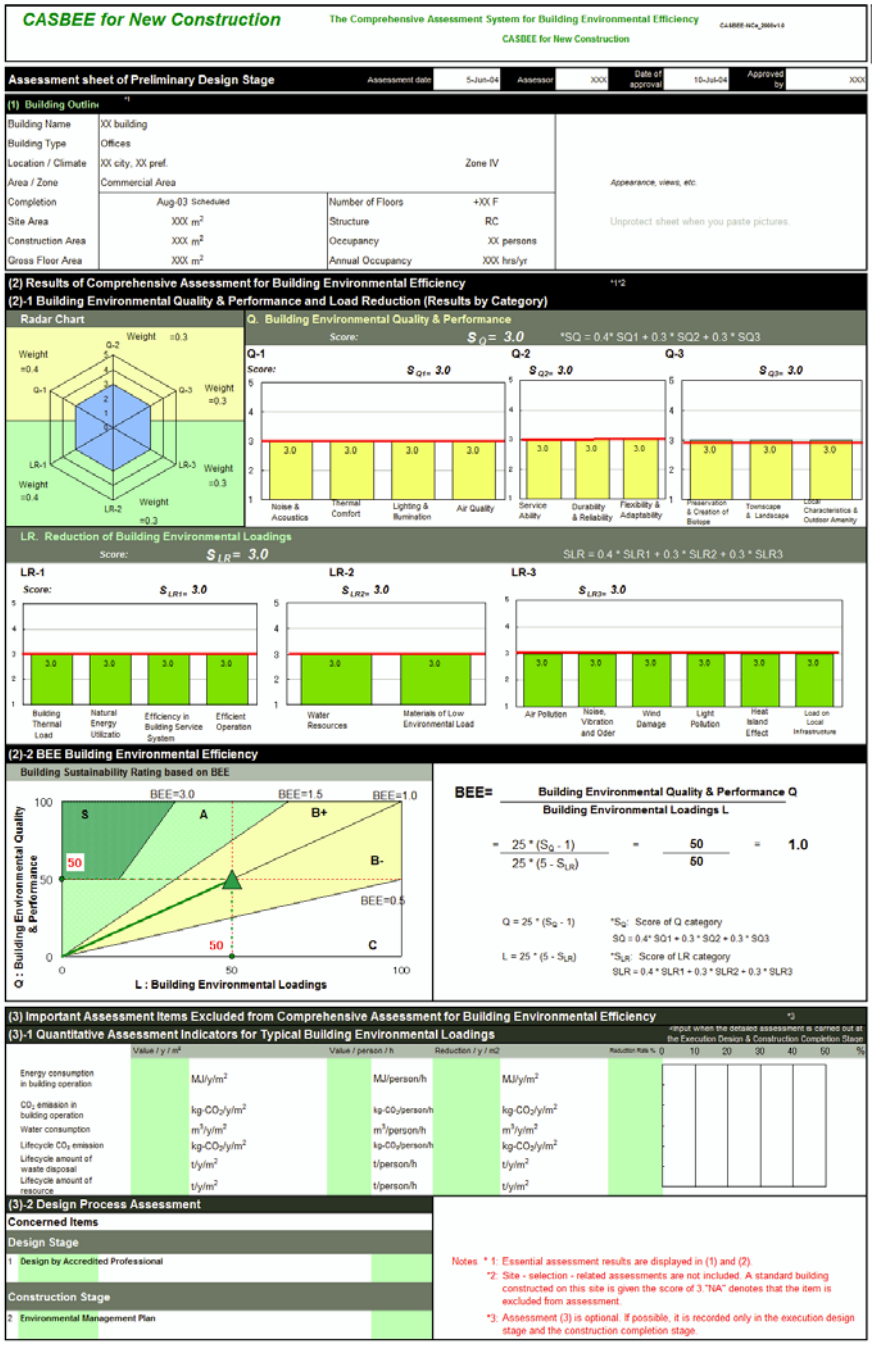


Figure 3.8 Assessment Results Sheet for CASBEE for Existing Building

Table 3.4 Content of the Assessment Results Sheet

(1)	Building outline		Display content
(2)	CASBEE assessment results		Graphical presentation of assessment results
	(2)-1	Q (Building environmental quality and performance)	Bar graph of assessment results in each category
		LR (Reduction of building environmental loadings)	
	(2)-2	BEE (Building Environmental Efficiency)	Display of Q and L assessment results and BEE
(3)	Important assessment items excluded from Comprehensive Assessment for Building Environmental Efficiency		Environmental performance not included in (2)
	(3)-1	Qualitative assessment indicators for representative building environmental loads	Significant quantitative assessment items as a building environmental performance assessment
	(3)-2	Design process assessment	Items concerning building management

(1) Building outline

Shows the project summary information from the (I) Building Outline section of the Main Sheet, including building name, type, location, scale and structure.

(2) Comprehensive assessment for building environmental efficiency

The assessment results for environmental performance assessment items on the building itself are presented in this column. It shows graphs of the input results for the scoring items collated on the Score Sheet.

(2)-1 Environmental quality and performance and load reduction of the building (results by categories)

Q (Building environmental quality and performance) presents bar graphs of assessment results for the categories listed on the top row, which are Q-1 Indoor Environment, Q-2 Quality of Service and Q-3 Outdoor Environment on Site. Similarly, assessment results for LR (Reduction of building environmental loadings) are presented at the bottom of the table for LR-1 Energy, LR-2 Resources & Materials and LR-3 Off-site Environment. The scores for the six categories from Q-1 to LR-3 are shown together in a radar chart on the left, to give an immediately clear presentation of the characteristics of environmental considerations in the subject building.

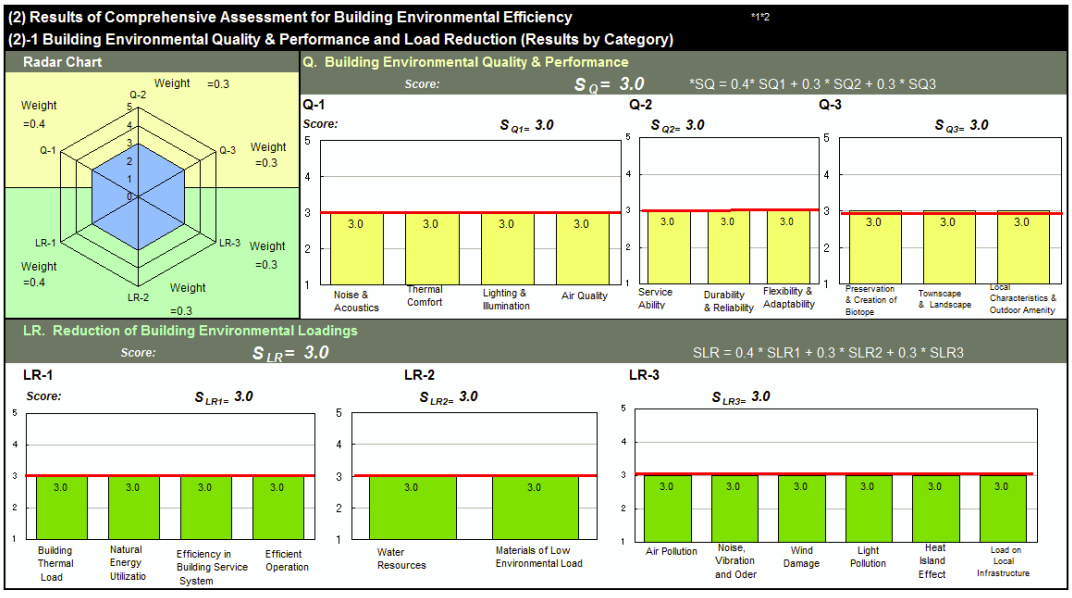


Figure 3.9 Enlargement of the Assessment Results Sheet (2)-1 (display by radar chart and bar graph)

(2)-2 Building Environmental Efficiency (BEE)

Building Environmental Efficiency (BEE), which is calculated from the assessment results of Q (Building Environmental Quality & Performance) and L (Building Environmental Loadings), is shown here. The values for Q and L are derived from S_Q (the total score for the Q categories) and S_{LR} (the total score for the LR categories). The formula to calculate BEE using Q and L is displayed on the right of the graph. First the numerator Q is defined as $Q=25(S_Q-1)$ to convert the S_Q (1~5) for the building environmental quality and performance into the Q scale of 0~100. Then the denominator L is defined as $L=25(5-S_{LR})$ to convert the S_{LR} (1~5 points) for load reduction into the L scale of 0~100.

BEE is presented as a graph on the left, with Q on the Y axis and L on the X axis, so that BEE is the gradient of the line joining the point with coordinates equal to the Q and L values to the origin (Q=0, L=0). The higher the Q value and the lower the L value, the steeper the gradient and the more sustainable the building is. CASBEE labels buildings with an overall building environmental performance assessment classification from C (poor) through B-, B+, A and S (excellent), corresponding to regions divided according to the line gradient.

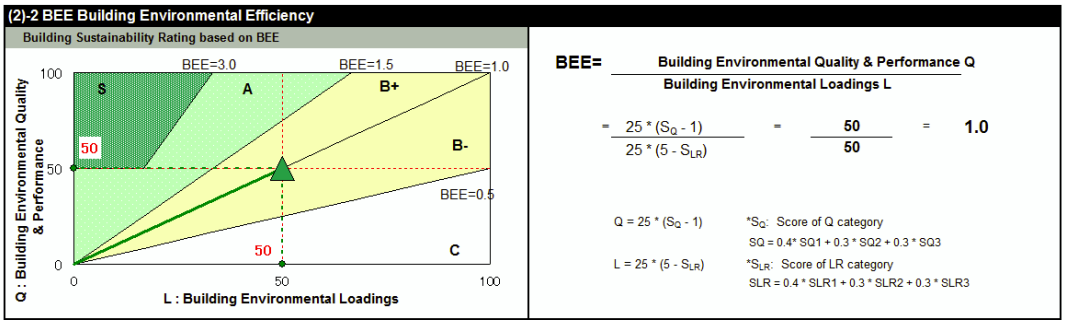


Figure 3.10 Enlargement of the Assessment Results Sheet (2)-2 (display by BEE)

(3) Important assessment items excluded from comprehensive assessment for building environmental efficiency

This is the column to enter indicators which are not included in assessment under (2), but which are important for building environmental performance assessment.

(3)-1 Quantitative assessment indicators for typical building environmental loads.

Calculate and enter the results for primary energy consumption in operation, water consumption volume and $LCCO_2$, represented by the LCA results. The figures displayed here are representative quantitative values for building environmental performance assessment. If possible the evaluated building and a standard building may be compared and a reduction value and reduction rate indicated for each assessment value. Enter the above on completion of the Execution Design Stage, and on completion of the Construction Completion Stage. For the time being, the assessor can select a suitable LCA method[*2] for the assessment process from among the various published LCA methods.

(3)-2 Design process assessment

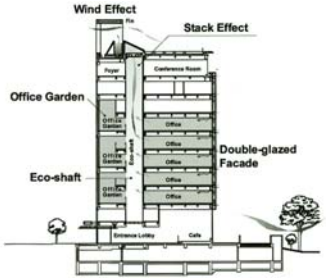
This is the area for checking items that are important environmental considerations in building management (CM etc.), mainly as program. Check matters such as whether there is an environmental management plan for the construction site. However, assessment of items relating to site selection is excluded from consideration as they are handled by CASBEE for Pre-design.

[2] "LCA Guideline for Buildings" (AIJ)

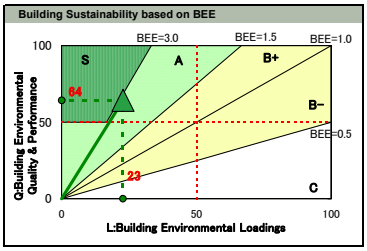
Note: Many of the buildings evaluated here as examples embody highly active environmental consideration. Therefore the reader should note that this is a concentration of relatively high rankings. Also, the buildings presented here are all anonymous. The owners and other relevant parties should be contacted before visiting any of these buildings.

4. Case Studies

Case A — Class A (BEE: 2.8)



Building outline
Building type: Office
Location:Chiyoda-ward,Tokyo
Site area: 1,955m^2
Total floor area: 9,135m^2
Floors: +10, -1
Completion: July 2002



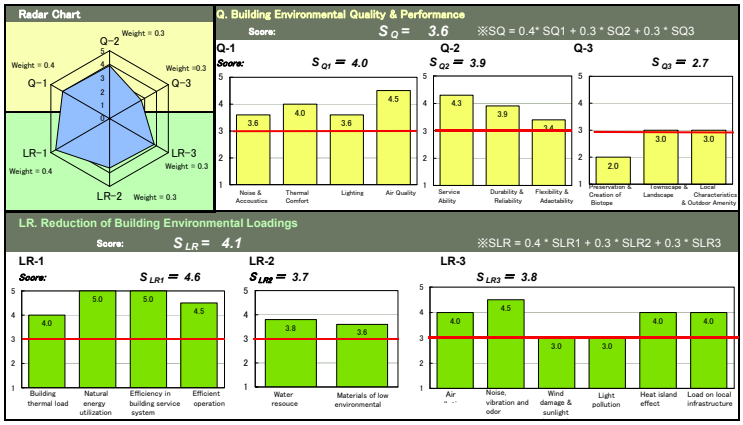
Building Feaures

(1) Resource consumption: Glass is used to cover almost the entire facade, improving the building's durability and ease of maintenance. Also, the CFT structure and vibration damping system produce high rigidity and earthquake resistance, which extend the service life of the building.

(2) Environmental loadings: A number of energy-saving measures have been employed. Low-E glass and a double-skin facde give high insulation and air sealing performance, while the eco-shaft and the double-skin facde generate ventilation from wind power and temperature gradients, and large windows make full use of daylight.

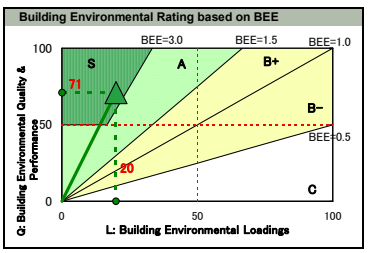
(3) Indoor environment: The building core is placed on the side nearest the road, which carries intense traffic, blocking the noise and the western light while allowing large windows on the east side, which commands a good view.

(4) Miscellaneous Ice-based thermal storage system: Dispersed secondary pumps and BEMS provide optimized control and energy-saving management.



Case B — Class S (BEE：3.6)

Building outline
Building type: Office
Location:Kawasaki city,
Kanagawa prefecture
Site area: 30,003m^2
Total floor area: 79,554.17m^2
Floors: +26, -2
Completion: January 2000



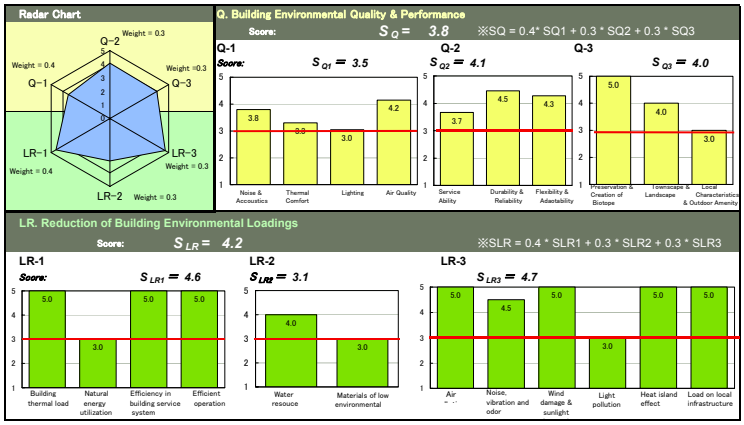
Building Feaures

Clear targets were set for environmental conservation, starting with a major reduction in $LCCO_2$, and these targets were applied to all life cycle stages from conceptual design through design, operation, demolition and renewal.

(1) Resource: recycling Effective use of water resources (gray water reuse and rainwater use), waste recycling (recycle rate) improvement, organic waste composting, renewal space allowance, floor loading allowance.

(2) Energy: Airflow windows are used to cut perimeter load, and daylight sensors control lighting.

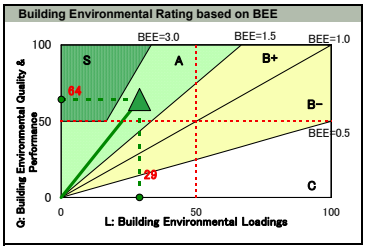
(3) Off-site environment: Extensive greening on artificial ground and provision of public space with a water park area.



Case C

Class A (BEE:2.2)

Building outline
Building type: Office
Location: Koto ward, Tokyo
Site area: 1,919m^2
Total floor area: 9,634m^2
Floors: +6
Completion: October, 2003



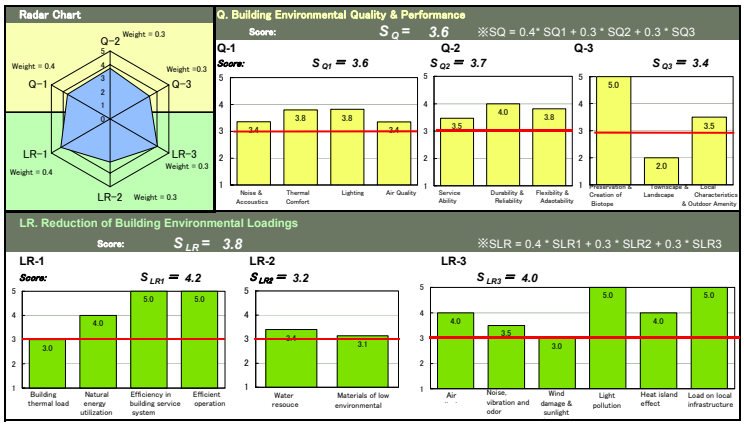
Building Features

(1) Resource consumption: This is a long-life building, supported on a megastructure of six steelreinforced concrete columns (with seismic isolation devices on column heads). Long life reduces resource consumption for replacement construction.

(2) Environmental loadings: Efforts to reduce CO_2 emissions include floor-supply HVAC system that reduces power for air supply, ice storage system and building thermal mass storage system.Energy consumption is also reduced by the use of outside air for cooling in intermediate seasons.

(3) Indoor environment: Floor-supply HVAC system for the entire building floor area creates uniform and highly comfortable space.

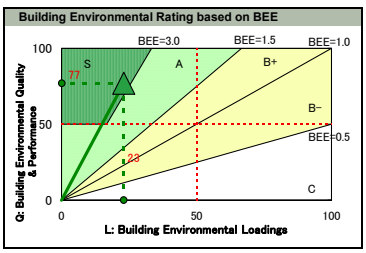
(4) Miscellaneous: The office space is protected by a 20dB electromagnetic shield to maintain a comfortable communications environment.



Case D

Class S (BEE:3.3)

Building outline
Building type: Office, music hall
Location: Shibuya ward, Tokyo
Site area: 1,015m^2
Total floor area: 5,357m^2
Floors: +9
Completion: March 2003



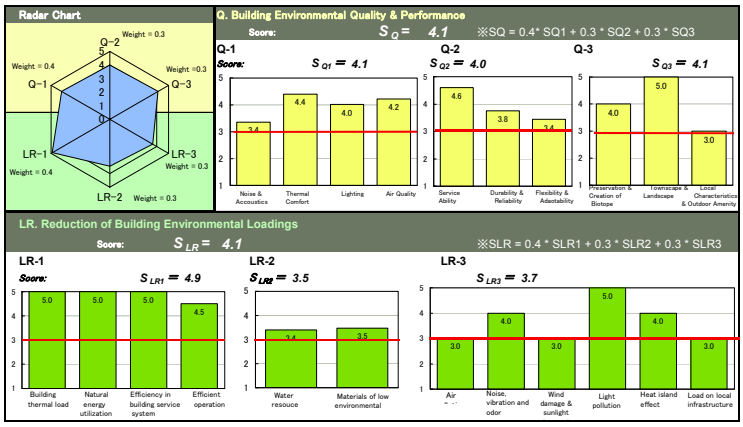
Building Features

(1) Indoor environment: Openings are arranged on the north side, with double glazing to improve insulation. The air conditioning uses an underfloor system capable of taking in twice the legal minimum volume of outside air, and pull fans on the northern perimeter draw in a cool draft. Light fixtures are OA louvered pendant fixtures that cast light up and down. They are automatically controlled in groups of four by brightness and occupant sensors.

(2) Quality of service: This is a direct ceiling office, with no equipment inside the ceiling and no false ceiling materials, so the height is 3,150mm. The exterior is maintenance free, using a Pcaversion tiled open-joint method.

(3) Energy: PAL190. Energy consumption is reduced by night purging, natural ventilation and hybrid air conditioning. Commissioning of energy saving is carried on continuously.

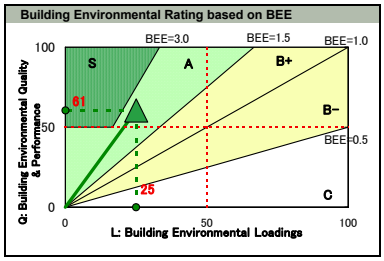
(4) Off-site environment: The roof has 20% plant coverage. Temporary rainwater storage and percolation equipment is in operation.



Case E

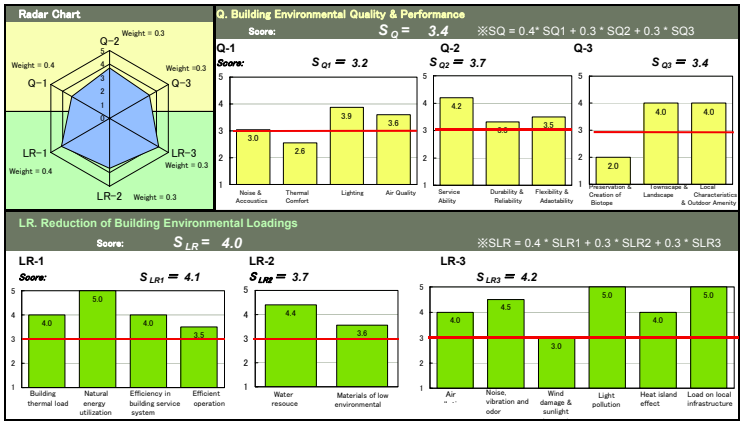
Class A (BEE:2.4)

Building outline
Building type: School
Location: Fukuoka prefecture
Site area: 49,330m^2
Total floor area: 36,183.m^2
Floors: +4
Completion: January 2003



Building Features

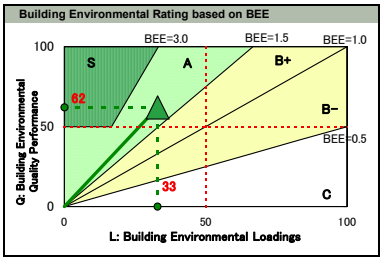
(1) Natural energy utilization: Classrooms are placed on the north side of the building, reducing solar loads, and daylight is used in an energy-saving lighting control system. Airflow planning using the classroom windows and the use of an automatic natural ventilation gallery is part of a natural ventilation plan for intermediate seasons. Cool tubes are used in part of the outside air intake system to reduce the load from outside air.
(2) Resource: saving Water resources are protected by the use of a rainwater reuse system, a gray water system, water-saving systems and other measures. In addition, a permeable exterior plan is used to restrict load on local infrastructure.
(3) Outdoor environment on site: Vegetation has been planted extensively around the site and on the roof. The exterior plan and building orientation were devised to consider the surrounding environment.



Case F

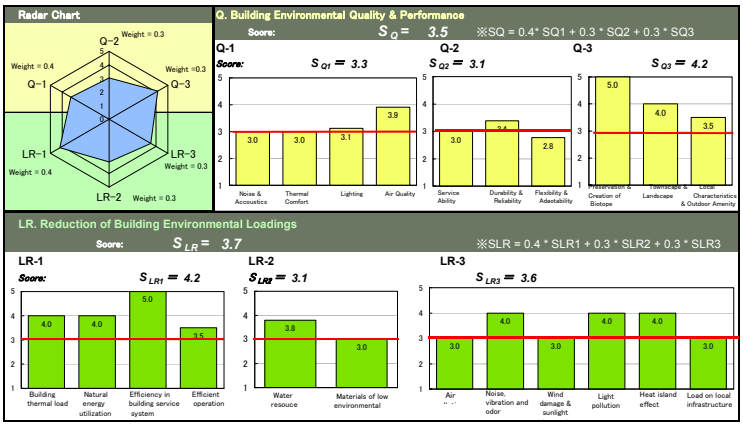
Class A (BEE: 1.9)

Building outline
Building type: School
Location: Tokyo
Site area: 22,916m^2
Total floor area: 9,762m^2
Floors: +4, -1
Completion: January 2001



Building Features

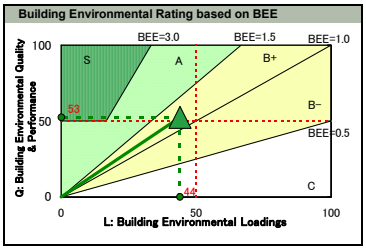
(1) Resource consumption: Rainwater usage equipment is installed and the building makes effective use of water resources.
(2) Environmental loadings: The large classroom windows are double glazed to improve insulation and a total enthalpy heat exchanger reduces outside air loads. Natural ventilation using the stack effect reduces cooling loads in intermediate seasons. Solar photovoltaic power generation equipment is installed to make effective use of natural energy.
(3) Indoor environment: Air conditioning return intakes are installed at the bottom of the front and rear walls in classrooms, and under lockers, as a way to alleviate cold feet in winter.
(4) Miscellaneous: Spring water rising on the site is used to form a natural marsh, and the marsh surroundings have been developed into a biotope that is used for environmental education. The paved path at the north side of the school building is made from permeable material to contribute to groundwater recharging and climate mitigation.



Case G

Class B$^+$ (BEE:1.2)

Building outline
Building type: Retailer
Location: Kyoto city, Kyoto prefecture
Site area: 40,400m^2
Total floor area: 84,000m^2
Floors: +4
Completion: August 1998

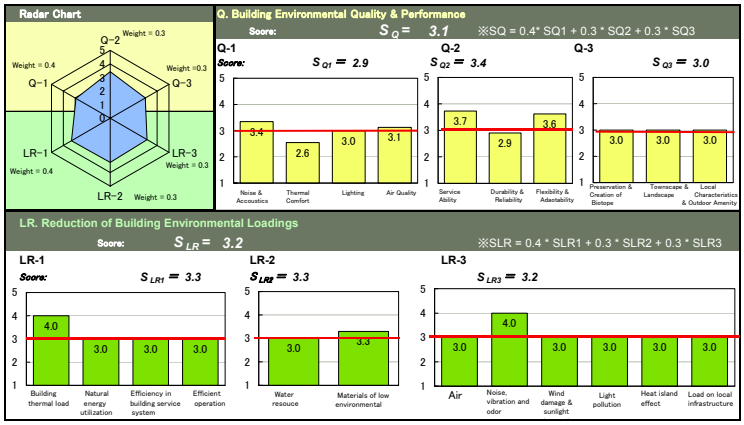


Building Features

(1) Indoor environment and service: The barrier free design is intended to allow anyone to shop freely. The interior design follows psychological considerations in its ample ceiling height and interior decor. Rest spaces and other facilities have also been provided to improve service functions.

(2) Energy: HF lamps are used for the basic lighting to achieve high efficiency, reducing power consumption and air conditioning loads. Car parking is located on the upper floors in order to reduce thermal loads and provide the car park with natural ventilation.

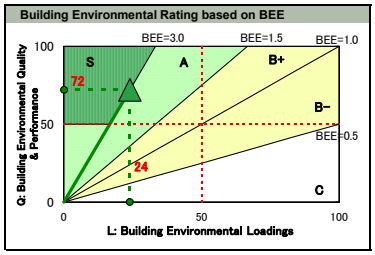
(3) Off-site environment: Shrubbery is planted along the edge of the site to create a hedge, which is intended to harmonize with the surrounding area. Consideration for the environment outside the site is also shown in planning for efficient transport, and in efforts to prevent noise and odor.



Case H

Class S (BEE:3.0)

Building outline
Building type: Office
Location: Yokohama city, Kanagawa prefecture
Site area: 2,499m^2
Total floor area: 5,645m^2
Floors: +4, 1 PH floors
Completion: March 1996



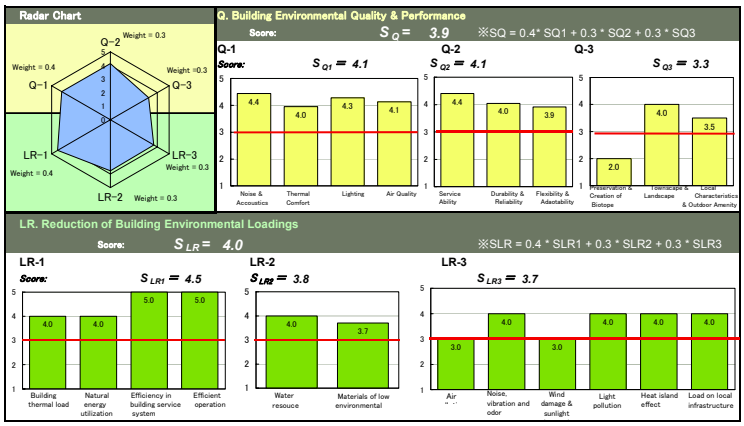
Building Features

(1) Resource consumption: Recycled materials are used as building materials, and consideration is given to reducing the consumption of resources. The exterior walls are of glassy materials which are relatively resistant to deterioration, and measures are taken to extend building lifespan, such as allowing ample story height.

(2) Environmental loadings: Large window areas are used to make maximum use of daylight. In particular, light shelves are used in the tops of office windows to reflect sunlight to the ceiling and draw natural light into the interior parts of rooms. Also, low-E glass is used in windows to increase insulation. Forced-air and thermal convection ventilation in atria and staircases, external air cooling, variable air volume control, CO_2 control in parking areas and other measures are used to save energy.

(3) Indoor Environment: Natural light and ventilation are used in working spaces, such as a meeting corner in an atrium, with abundant plants to harmonize with natural light.

(4) Miscellaneous: Rainwater and graywater use, cogeneration and BEMS are used to provide optimized control and energy-saving management.



Case I

Class A (BEE:2.2)

Building outline
Building type: Hospital
Location: Toyama prefecture
Site area: 31,287m^2
Total floor area: 13,959m^2
Floors: +6
Completion: May 2002

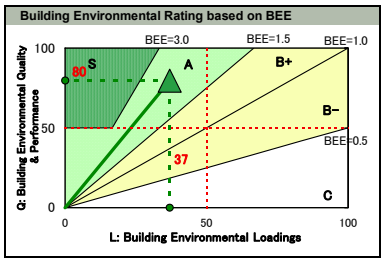
Building Features

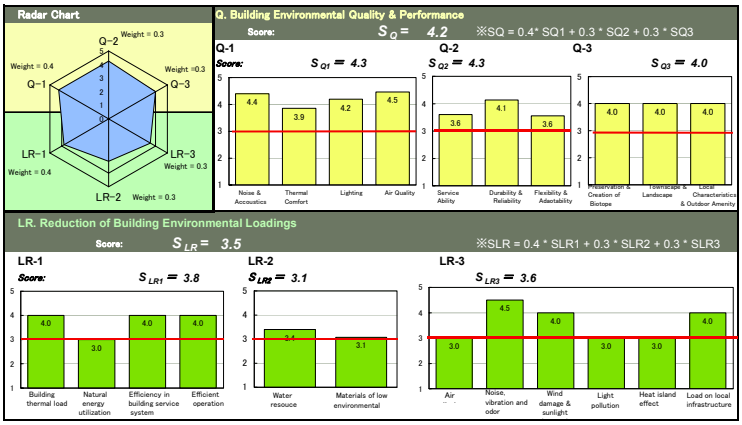
(1) Resource consumption: The light well in the center of the building provides natural ventilation and lighting. Balconies and eaves around the perimeter provide shade from sunlight. The building is located in a cold region, so the insulation performance of its outside walls has been improved and double glazing used in the windows. The seismic isolators are provided to maintain medical activities in th building in the case of earthquake disaster. It also extends the life of the building.

(2) Environmental loadings: RDF boilers which use the pelletized garbage fuel produced by the local authority's recycling center, are considered as a part of the local resource recycling system.

(3) Indoor environment: It is necessary to consider building services for the patients who have less resistance than healthy people in the hospital building project. Especially, the dialysis rooms, where patients lie on the bed for long hours, have air conditioning systems with ceiling panels for radiant heating and cooling.

(4) Miscellaneous: A variable air volume air conditioning system, a variable hot/cold water flow control system and BEMS are used to provide optimized control and energy-saving management.





Case J

Class A (BEE:1.6)

Building outline
Building type: Hotel
Location: Minato ward, Tokyo
Site area: 678m^2
Total floor area: 2,702m^2
Floors: +10
Completion: June 2003

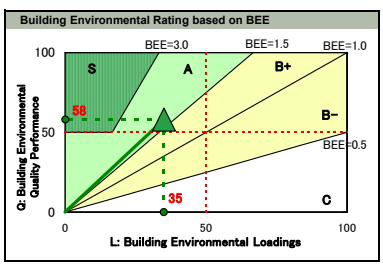
Building Features

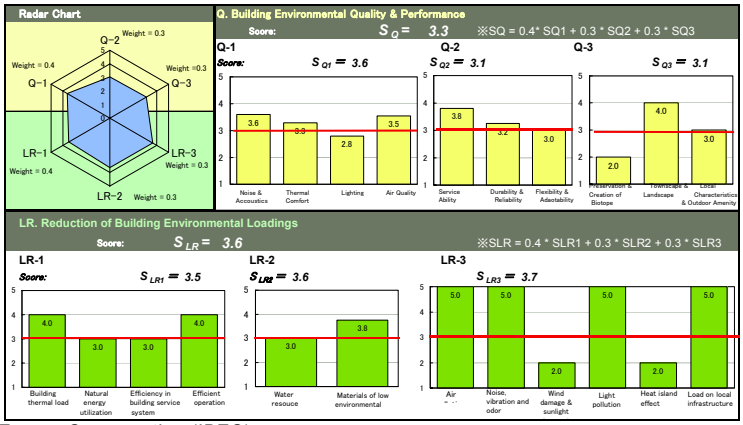
(1) Resource consumption: The large formwork system, which enables reusing formwork many times, was adopted to reduce formwork waste, and high-strength concrete is used to extend building service life. Recycled blocks are chosen for exterior paving considering the environment.

(2) Environmental loadings: The area of openings is minimized, and the openings are fitted with double-sliding shoji panels on the indoor side to reduce air conditioning loads. The air conditioning and water heating systems utilize air-source heat pumps to save energy.

(3) Indoor environment: The building is well set back from the front road to provide a good view, and vibration-generating equipment is installed avoiding the area directly above the top-floor cabins, to improve indoor environment.

(4) Miscellaneous: Water heating equipment utilizes CO_2 instead of CFC, and air conditioning equipment is operated by an ice thermal storage system, so that the building consumes only electricity, a clean energy source.

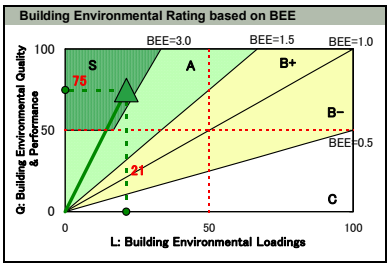




Case K

Class S (BEE:3.5)

Building outline
Building type: Apartment
Location: Chiba prefecture
Site area: 6,811m^2
Total floor area: 4,811m^2
Floors: +5
Completion: June 2000

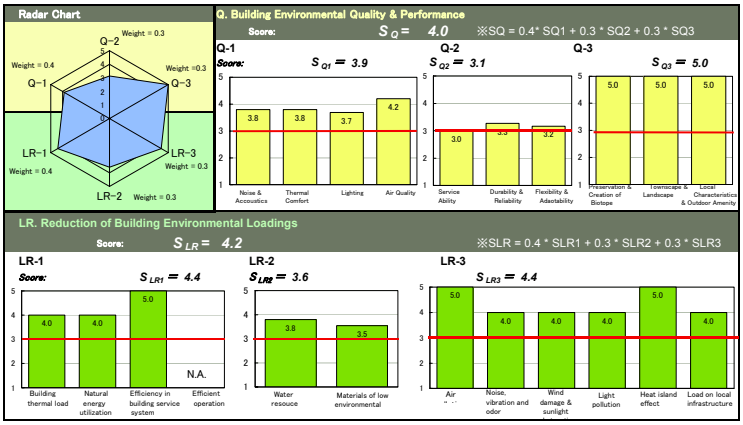


Building Features

(1) Energy saving through passive methods: Dispersed block layout, openings on three sides, openwork grilles over doors for natural ventilation, louvers for sunshading, planting over the roof, and a double roof to enhance roof insulation performance.

(2) Equipment planning: Ice thermal storage and multi-function heat pumps make effective use of electrical energy. Other measures include a central heat pump hot water system for low running costs, waste heat recovery and slab storage with heat radiation cooling, heat recovery and 24-hour ventilation.

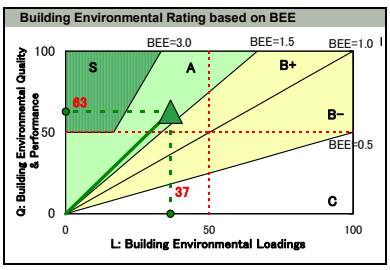
(3) Miscellaneous: Biotopes, preservation and use of existing trees, extension of building service life by using high-durability concrete.



Case L

Class A (BEE:1.7)

Building outline
Building type: Apartment
Location: Musashino city, Tokyo
Site area: 2,657m^2
Total floor area: 4,037m^2
Floors: +12
Completion: January 2003



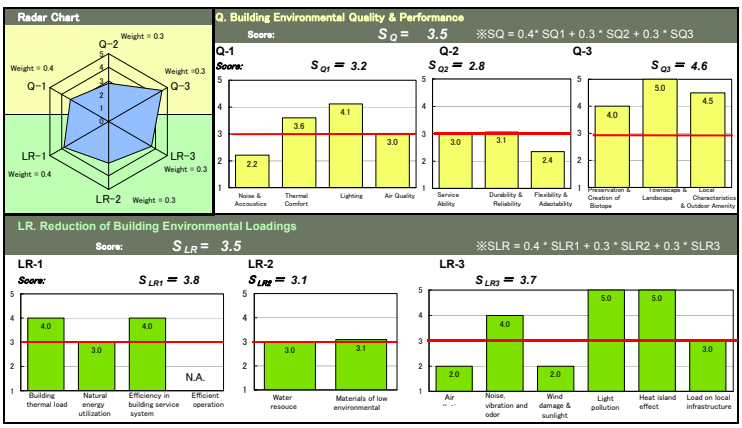
Building Features

(1) Resource consumption: This is shared housing in a simple form. It uses materials with good maintenance properties.

(2) Environmental loadings: Insulation meets the New Energy Saving Standard. Balconies and other elements control sunlight entry.

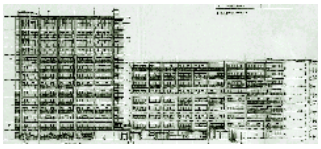
(3) Indoor environment: The building is situated in a quiet suburban area. Its major openings face south, creating a bright, sunny indoor environment.

(4) Miscellaneous: The previous topography and vegetation of the site were preserved through the construction as far as possible, building a living environment of rich greenery.

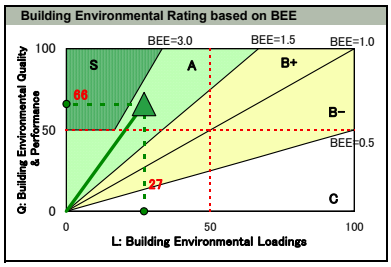


Case M

Class A (BEE:2.4)

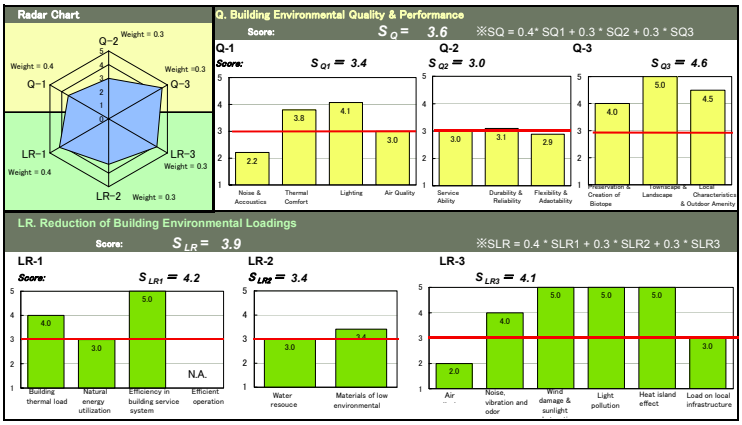


Building outline
Building type: Apartment
Location: Tokyo
Site area: 5,806m^2
Total floor area: 12,240m^2
Floors: +14
Completion: 2004 (scheduled)



Building Features

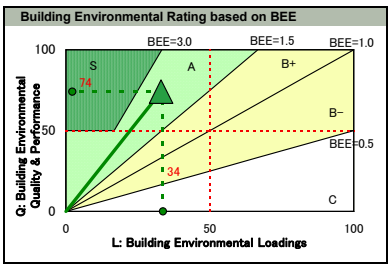
(1) Resource consumption: A support infill approach was used to increase the durability of the structural frame and provide ample story height.
(2) Environmental loadings: Insulation meets the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating for Housing (new-generation standard set in 1992). Balconies and other elements control sunlight entry.
(3) Indoor Environment: The buildings face a river, and the open housing plan aimed to secure natural airflow and take advantage of the view.
(4) Miscellaneous: The local environment was surveyed in detail, with particular attention to securing airflow through the site and using roof planting to improve the local thermal environment.



Case N

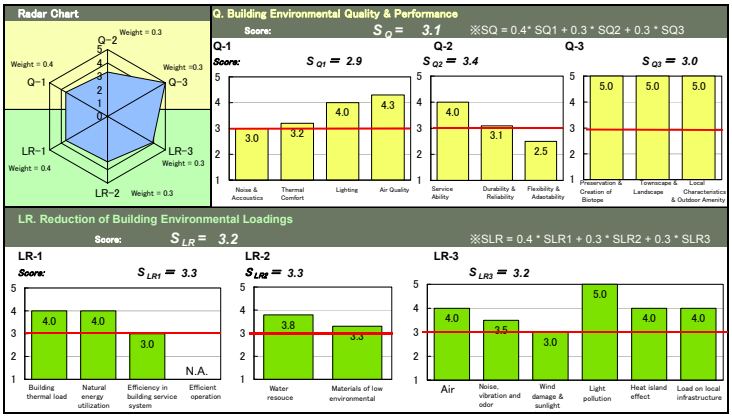
Class A (BEE:2.2)

Building outline
Building type: Apartment
Location: Setagaya ward, Tokyo
Site area: 7,388m^2
Total floor area: 6,200m^2
Floors: +3 to 5



Building Features

(1) Resource consumption: Recycled crushed stone is used as foundation material. Waste material from the previous building was used in the exterior. A water reservoir was built in the basement of block 1 to use rainwater, and each dwelling's balcony has a rainwater collection tank. Well water is used to run in a small stream and water the plants.
(2) Environmental loadings: Insulation performance meets the Criteria for Owner's Judgment on Energy Efficient Utilization in Residential Building (new-generation standard set in 1992). Vegetation is planted on the roof and walls. Solar collectors and wind power generators are used. Voids for daylighting and natural ventilation are used to draw breezes into the dwellings.
(3) Harmony with the surrounding environment: Water-permeable paving is used and existing trees have been preserved, with biotopes used to create habitat.
(4) Miscellaneous: Residents participated in the design process. There are public spaces, vegetable gardens, green areas and halls around the estate site, helping to form a rich community for the residents.



PART II. Scoring Criteria

For hospitals, hotels and apartments, it is important to note that there are assessment items that apply to the building as a whole (Q-3, LR-1, LR-2, LR-3) and others (Q-1, Q-2) that are applied separately to the common properties and to the residential and accommodation sections of the building. Thus for these three building types the user must carry out both assessment of the “Entire Building and Common Properties” and the “Residential and Accommodation Sections.”

Where "Inapplicable" is written in a space in the scoring criteria table, it means that there is no scoring for that item at the level concerned. When the space is blank, it means that scoring is optional at intermediate levels.

When the symbols listed below appear on the scoring items in the table, they indicate the building type and whether or not they are applicable.
The details are presented below.

Building type	Applicable	Not applicable
Offices	Off	Off
Schools	Sch	Sch
Retailers	Rtl	Rtl
Restaurants	Rst	Rst
Halls	Hal	Hal
Hospitals	Hsp	Hsp
Hotels	Htl	Htl
Apartments	Apt	Apt
Factories	Fct	Fct

1. Preliminary Design Stage

Q: Building Environmental Quality & Performance

Q-1 Noise & Acoustics

When evaluating “Hospitals,” “Hotels” and “Apartments” for Q-1, evaluate the common properties of each building (hospital outpatient waiting rooms, hotel lobbies, apartment entrance halls etc.). For private areas, (hospital bedrooms, hotel guest rooms, apartment housings), base the assessment on Q-1 assessment of Residential and Accommodation Sections.

● 1. Noise & Acoustics

● 1.1 Noise

● 1.1.1 Background Noise

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

unit: dB(A)

Entire Building and Common Properties	
Building type	Hal
Level 1	More than 40
Level 2	More than 37, 40 or less
Level 3	More than 33, 37 or less
Level 4	More than 30, 33 or less
Level 5	30 or less

☐ Commentary

Evaluate the target background noise level set at the Preliminary Design Stage.
For building types classified as “Halls” evaluate building types that particularly require anti-noise measures, such as meeting halls, theaters and movie theaters. Exclude other building types.

● 1.1.2 Equipment Noise

Inapplicable at the Preliminary Design Stage.

● 1.2 Sound Insulation

● 1.2.1 Sound Insulation of Openings

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rst・Hsp・Htl・Apt・Fct
Level 1	Noise from ordinary traffic causes annoyance.
Level 2	
Level 3	Noise from ordinary traffic does not cause annoyance.
Level 4	
Level 5	Noise from loud means of transport, such as trunk roads and aircraft, does not cause annoyance

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Residential and Accommodation Sections	
Building type	Hsp･Htl･Apt
Level 1	Noise from ordinary traffic causes annoyance.
Level 2	
Level 3	Noise from ordinary traffic does not cause annoyance.
Level 4	
Level 5	Noise from loud means of transport, such as trunk roads and aircraft, does not cause annoyance

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate the sound insulation performance of sash windows and other furniture on the building openings. Where there are multiple openings, evaluate the type with the lowest performance.

The higher the sound insulation performance of the openings, the better external noise from traffic and other sources can be blocked from entering. Do not evaluate retailers because they have few openings.

● 1.2.2 Sound Insulation of Partition Walls

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Sch･Rst･Fct
Level 1	People's ordinary voices cause annoyance.
Level 2	
Level 3	People's ordinary voices do not cause annoyance
Level 4	
Level 5	People's ordinary voices are almost inaudible.

Residential and Accommodation Sections	
Building type	Apt
Level 1	Activities in the next home can be clearly heard.
Level 2	
Level 3	Activities in the next home can be heard but are not intrusive.
Level 4	
Level 5	No sound from the next home.
Building type	Hsp
Level 1	The content of TV, radio and conversation can be understood.
Level 2	
Level 3	The sounds of TV, radio and conversation can be heard at low volume.
Level 4	
Level 5	The sounds of TV, radio and conversation can barely be heard.
Building type	Htl

Level 1	Ordinary sounds such as TV, radio and conversation can barely be heard loudly.
Level 2	
Level 3	Ordinary sounds such as TV, radio and conversation can barely be heard faintly.
Level 4	
Level 5	The sounds of TV, radio and conversation cannot normally be heard.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Qualitatively evaluate the level of sound insulation performance of partition walls between rooms.
Retail stores commonly have no partitions between sales areas, so they need not be evaluated for sound insulation performance of partition walls.

- 1.2.3 Sound Insulation of Floor Slabs (light-weight impact source)

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Sch
Level 1	Noise of chair movement and falling objects is intrusive.
Level 2	
Level 3	Noise of chair movement and falling objects causes annoyance.
Level 4	
Level 5	Noise of chair movement and falling objects is just audible but quiet.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Noise of chair movement and falling objects causes considerable annoyance.
Level 2	
Level 3	Noise of chair movement and falling objects is audible but quiet.
Level 4	
Level 5	Noise of chair movement and falling objects is almost inaudible.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Light impact noise is the kind of noise generated by light impacts such as a chair being dragged on a hard floor. The better the sound insulation performance of a floor slab, the more floor impact sound it blocks. The qualitative assessment used here is for floor impact sound by light-weight impact source, as envisaged for classrooms in “Schools,” guest/ sick room in “Hotels”/ “Hospitals” and living room in “Apartments.”

- 1.2.4 Sound Insulation of Floor Slabs (heavy-weight impact source)

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Sch
Level 1	The noise of people jumping and running causes considerable annoyance.
Level 2	
Level 3	The noise of people jumping and running is considerably audible.
Level 4	
Level 5	The noise of people jumping and running is audible but quiet.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	The noise of people jumping and running causes annoyance.
Level 2	
Level 3	The noise of people jumping and running is audible.
Level 4	
Level 5	The noise of people jumping and running is audible but rarely noticed.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Heavy impact noise is the kind of noise generated by heavy impacts such as children jumping. The better the sound insulation performance of a floor slab, the more floor impact sound it blocks. The qualitative assessment used here is for floor impact sound by heavy-weight impact source, as envisaged for classrooms in “Schools,” guest/ sick room of “Hotels”/ “Hospitals” and living room of “Apartments.”

- 1.3 Sound Absorption

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hsp・Htl・Apt・Fct
Level 1	Sound absorbent materials are not used.
Level 2	
Level 3	Sound absorbent materials are in either the walls, floor or ceiling.
Level 4	
Level 5	Sound absorbent materials are in the walls, floor and ceiling.

Residential and Accommodation Sections	
Building type	Hsp･Htl･Apt
Level 1	Sound absorbent materials are not used.
Level 2	
Level 3	Sound absorbent materials are in either the walls, floor or ceiling.
Level 4	
Level 5	Sound absorbent materials are in the walls, floor and ceiling.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate the ease of absorption of noise by interior materials.

Raising the sound absorption rate attenuates noise entering the interior or generated within it, thereby reducing noise levels. The average sound absorption of the finishes in a room is found from absorption rates, but this assessment simply evaluates whether materials for that purpose are used in the floor, walls and ceiling.

● 2. Thermal Comfort

● 2.1 Room Temperature Control

● 2.1.1 Room Temperature Setting

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Hsp･Htl･Apt･Fct
Level 1	Temperature settings of 20˚C in winter and 28˚C in summer, which require tolerance of some discomfort.
Level 2	
Level 3	Ordinary setting of 22˚C in winter and 26˚C in summer.
Level 4	
Level 5	By referring the ASHRAE*[3]Comfortable Room Temperature Range and the POEM-O*, it is set ranges of 22~24˚C in winter and 24~26˚C in summer.
Building type	Sch
Level 1	Temperature settings of 10˚C or more in winter and 30˚C or less in summer, which require tolerance of some discomfort.
Level 2	
Level 3	Ordinary setting of 18~20˚C in winter and 25~28˚C in summer.
Level 4	
Level 5	By referring the ASHRAE Comfortable Room Temperature Range and the POEM-O*, it is set ranges of 22~24˚C in winter and 24~26˚C in summer.

[3] American Society of Heating, Refrigerating and Air-conditioning Engineers. POEM-O is an acronym for Post-Occupancy Assessment Method – Office, an indoor environment assessment method developed for offices by the Indoor Environment Forum (a joint private academic sector research group sponsored by the former Architecture Research Institute

Building type	Rtl・Rst・Hal
Level 1	Temperature settings of 18˚C in winter and 28˚C in summer, which require tolerance of some discomfort.
Level 2	
Level 3	Ordinary setting of 20˚C in winter and 26˚C in summer.
Level 4	
Level 5	By referring the ASHRAE Comfortable Room Temperature Range and the POEM-O, it is set ranges of 20~22˚C in winter and 24~26˚C in summer.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Temperature settings of 20˚C in winter and 28˚C in summer, which require tolerance of some discomfort.
Level 2	
Level 3	Ordinary setting of 22˚C in winter and 26˚C in summer.
Level 4	
Level 5	By referring the ASHRAE Comfortable Room Temperature Range and the POEM-O, it is set ranges of 22~24˚C in winter and 24~26˚C in summer.
Building type	Apt
Level 1	Setting to 18˚C in winter and 28˚C in summer are forced in each room.
Level 2	
Level 3	Ordinary setting of 22˚C in winter and 26˚C in summer in each room.
Level 4	
Level 5	Setting ranges of 22~24˚C in winter and 24~26˚C in summer in each room.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate according to the set target value for room temperature. This is the representative indicator of the thermal environment, as the thermal environment is broadly determined by the temperature setting. Level settings are based on the following sources.

Level 1: Legally stipulated level. For school, based on New School Sanitation Standards of the Ministry of Education, Culture, Sports, Science and Technology of Japan.

Level 3: Level for general society, or specification of Japanese Ministry of Land, Infrastructure and Transport. For school, based on table of School Sanitation Standards for metropolitan schools, or general recommended values

Level 5: Human-oriented environment

In apartments, room temperature settings should be evaluated for one dwelling to represent the block as a whole. (Portions corresponding to standard floors in offices).

*POEM-O is an acronym for Post-Occupancy Assessment Method - Office, an indoor environment assessment method developed for offices by the Indoor Environment Forum (a joint private-academic sector research group sponsored by the former Architecture Research Institute). (■ Bibliography 1)

■Bibliography 2),3),4),5),6),7)

● 2.1.2 Variable Loads & Following-up Control

Inapplicable at the Preliminary Design Stage.

● 2.1.3 Perimeter Performance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Insufficient attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and insolation blocking and insulation performance are poor.
Level 2	
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and there is no practical problem with insolation blocking and insulation performance.
Level 4	
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and the building has the highest level of insolation blocking and insulation performance.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Insufficient attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and insolation blocking and insulation performance are poor.
Level 2	
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and there is no practical problem with insolation blocking and insulation performance.
Level 4	
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and the building has the highest level of insolation blocking and insulation performance.
Building type	Apt
Level 1	Exterior walls and roof materials composition and opening specifications corresponding to grade 1 of Measures for Energy Conservation under Housing Quality Assurance Law
Level 2	
Level 3	Exterior walls and roof materials composition and opening specifications corresponding to grade 2 of Measures for Energy Conservation under Housing Quality Assurance Law
Level 4	Exterior walls and roof materials composition and opening specifications corresponding to grade 3 of Measures for Energy Conservation under Housing Quality Assurance Law
Level 5	Exterior walls and roof materials composition and opening specifications corresponding to grade 4 of Measures for Energy Conservation under Housing Quality Assurance Law

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate ability to block thermal infiltration from the surroundings.

Evaluate whether window systems and exterior walls have been selected to exclude outside disturbances as far as possible, in order to maintain room temperature. Even with inferior perimeter performance, it is possible to meet the temperature setting at the thermostat position, provided the temperature setting is not unreasonable and the equipment has sufficient capacity, but if there are windows and walls that have extremely low or high surface temperatures, there will be inconsistencies in temperature within the room. Vertical temperature difference and radiation from exterior walls and windows will cause localized discomfort to occupants.

At the Preliminary Design Stage, it is likely that specific values for building envelope performance will not

have been set, so the above content should be judged according to the designers' design intentions and policies. In cases where the actual performance can be judged, evaluate it with reference to assessment criteria for 2. Execution Design and Construction Completion Stage

● 2.1.4 Zoned Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hsp・Htl・Fct
Level 1	There is no zoning of heating and cooling within a single floor, and a single-circuit air conditioning system is planned*. Switching between heating and cooling is required for the selection of air conditioning modes.
Level 2	
Level 3	Each floor is divided into multiple zones according to their orientation or thermal loads, and the air conditioning system is planned to allow either heating or cooling in each zone*.
Level 4	
Level 5	Each floor is divided into many small zones, and the air conditioning system is planned to allow either heating or cooling in zone units*.
Building type	Rtl・Rst・Hal
Level 1	There is no zoning of heating and cooling within a single floor, and a single-circuit air conditioning system is planned. Switching between heating and cooling is required for the selection of air conditioning modes.
Level 2	
Level 3	Each floor is divided into multiple zones according to their thermal loads or other factors, and the air conditioning system is planned to allow either heating or cooling in each zone.
Level 4	
Level 5	Each floor is divided into many small zones for individual sales areas or tenants, and the air conditioning system is planned to allow either heating or cooling in zone units.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*In cases where airflow windows are used to make the space perimeterless, or in small offices with little depth, the first half of the description, concerning the distinction between perimeter and interior, may be ignored.

□ Commentary

Evaluate whether a finely-zoned air conditioning system is used to eliminate temperature variations and create a comfortable environment in the interior.

● 2.1.5 Temperature & Humidity Control

Inapplicable at the Preliminary Design Stage.

● 2.1.6 Individual Control

Inapplicable at the Preliminary Design Stage.

● 2.1.7 Allowance for After-hours Air Conditioning

Inapplicable at the Preliminary Design Stage.

● 2.1.8 Monitoring Systems

Inapplicable at the Preliminary Design Stage.

● 2.2 Humidity Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Humidity is free to vary within the 40~70% range set by the Law for Maintenance of Sanitation in Buildings.
Level 2	
Level 3	The system has humidification functions which are generally set for 40% in winter and 50% in summer*.
Level 4	
Level 5	The system has humidification and dehumidification functions and is set for a range of 45~55% with reference to the ASHRAE Comfortable Room Temperature Range and POEM-O.
Building type	Sch
Level 1	Humidity setting is free to vary within the 30~80% range.
Level 2	
Level 3	The system has humidification functions, which are generally set for 40~70% in winter and 50~65% in summer*.
Level 4	
Level 5	The system has humidification and dehumidification functions, and is set for a range of 45~55% with reference to the ASHRAE Comfortable Room Temperature Range and POEM-O.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*In winter it will be relieved somewhat from the maximum level. Assuming dehumidification using cooling coil for summer and humidification using humidifier for winter are provided through general air conditioning equipment.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Humidity is free to vary within the 40~70% range set by the Law for Maintenance of Sanitation in Buildings.
Level 2	
Level 3	The system has humidification functions which are generally set for 40% in winter and 50% in summer*.
Level 4	
Level 5	The system has humidification and dehumidification functions and is set for a range of 45~55% with reference to the ASHRAE Comfortable Room Temperature Range and POEM-O.
Building type	Apt
Level 1	No consideration given.
Level 2	(Inapplicable)
Level 3	Appropriate ventilation functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.
Level 4	Dehumidification functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.
Level 5	Dehumidification and humidification functions are provided and set to a comfort range of 45~55%, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*In winter it will be relieved somewhat from the maximum level. Assuming dehumidification using cooling coil for summer and humidification using humidifier for winter are provided through general air conditioning equipment.

☐ Commentary

Evaluate according to the set target value for humidity. Dehumidification and humidity control intended to provide comfort in summer, and humidification for health reasons in winter are regarded as important services.
Level 1: Legally stipulated level. For school, based on New School Sanitation Standards of the Ministry of Education, Culture, Sports, Science and Technology of Japan.
Level 3: Level for general society, or specification of the Japanese Ministry of Land, Infrastructure and Transport. For school, based on table of School Sanitation Standards for metropolitan schools, or general recommended values.
Level 5: Human-oriented environment

■Bibliography 3),8)

● 2.3 Type of Air Conditioning System Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature difference and air speed in the room.
Level 2	
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature difference and air speed in the room.
Level 4	
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature difference and air speed in the room.

*This refers to, for example, ceiling and floor radiant heating and cooling systems, or floor-vented systems etc.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature difference and air speed in the room.
Level 2	
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature difference and air speed in the room.
Level 4	
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature difference and air speed in the room.
Building type	Apt
Level 1	The air conditioning system was chosen with no particular consideration for the vertical temperature difference and air speed in air-conditioned rooms, or for temperature differences between air-conditioned and non-air-conditioned rooms.
Level 2	
Level 3	The air conditioning system was chosen with consideration for the vertical temperature difference and air speed in air-conditioned rooms, or for temperature differences between air-conditioned and non-air-conditioned rooms.
Level 4	
Level 5	The air conditioning system was chosen with consideration to achieve less differences for the vertical temperature and air speed in air-conditioned rooms, or for temperature between air-conditioned and non-air-conditioned rooms.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*This refers to, for example, ceiling and floor radiant heating and cooling systems, or floor-vented systems etc.

☐ Commentary

Evaluate whether the air conditioning was chosen to mitigate the vertical temperature difference and air speed (residual wind speed) in the room.

The design stage of air conditioning equipment involves consideration of various air conditioning methods to choose the system that will best avoid causing localized discomfort to room occupants.

Therefore it is not possible to name an air conditioning system that will always create a comfortable environment, but the air conditioning system should be evaluated on the basis of past results and design policies. The space for which vertical temperature difference and air speed are evaluated should be the occupancy zone, and the evaluated points should be the vertical temperature difference and air speed in the space occupied by humans. The temperature difference evaluated should be that between heights of 0.1m and 1.7m (around 2.0m) with zone of uniform temperature as the target standard.

● 3. Lighting & Illumination

● 3.1 Daylighting

● 3.1.1 Daylight Factor

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

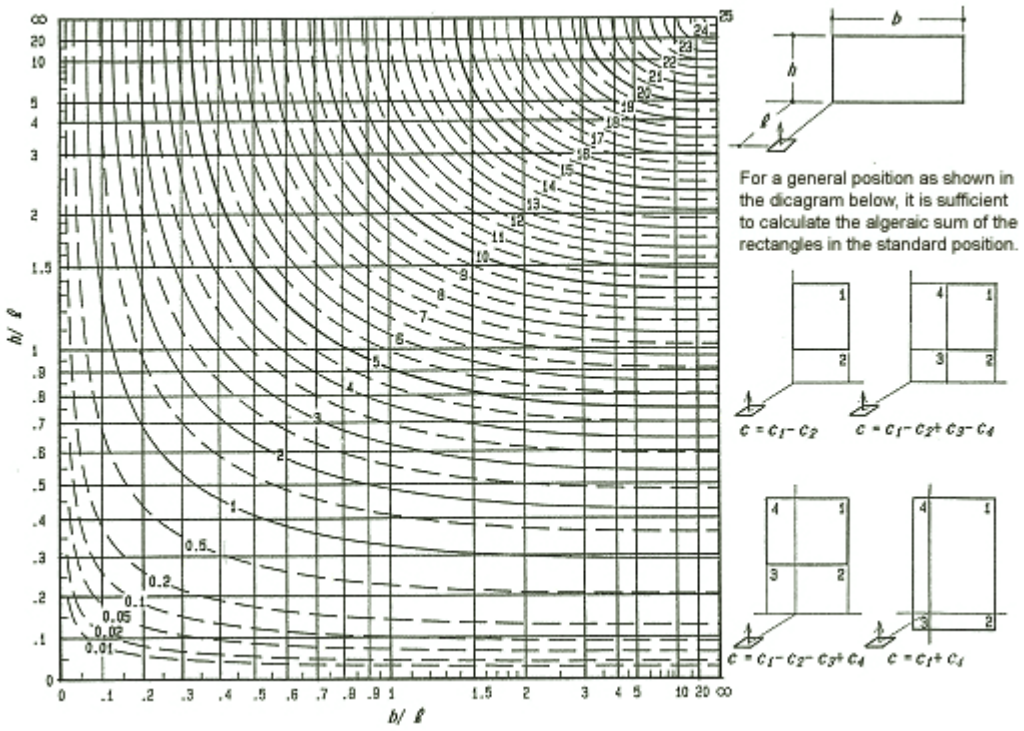
Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Apt・Fct
Level 1	Daylight factor: Less than 1.0%
Level 2	Daylight factor: 1.0% or more, less than 1.5%
Level 3	Daylight factor: 1.5% or more, less than 2.0%
Level 4	Daylight factor: 2.0% or more, less than 2.5%
Level 5	Daylight factor: 2.5% or more

Residential and Accommodation Sections		
Building type	Hsp	Htl・Apt
Level 1	Less than 0.5%	Less than 0.5%
Level 2	0.5% or more, less than 0.75%	0.5% or more, less than 1.0%
Level 3	0.75% or more, less than 1.0%	1.0% or more, less than 1.5%
Level 4	1.0% or more, less than 1.25%	1.5% or more, less than 2.0%
Level 5	1.25% or more	2.0% or more

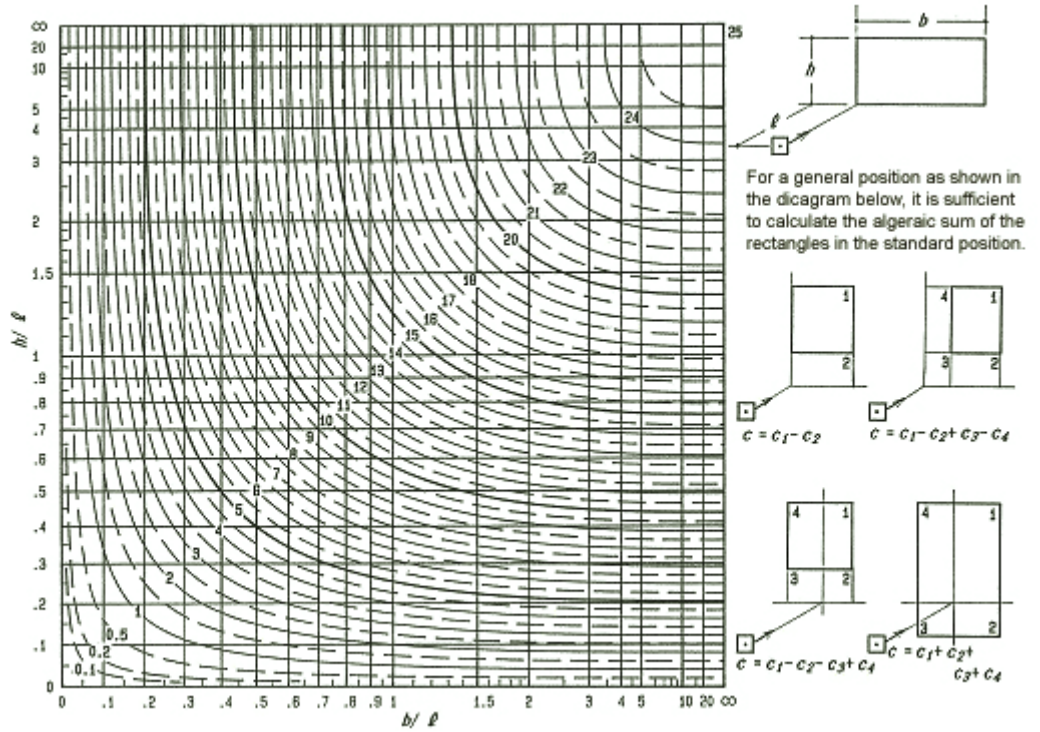
☐ Commentary

Daylight factor is an indicator for the proportion of available daylight that can be taken into the interior, depending on the size of the openings. The calculation point is set at the center of the floor surface of the room and the daylight factor is derived from the two calculation charts. (Reference 1 and 2) Reference 1 is the chart for an ordinary window in a wall, and Reference 2 is for skylights and other forms. The types of rooms for assessment are expected to be standard administrative offices, classrooms in “Schools,” and lobbies and other common areas in “Apartments,” “Hospitals” and “Hotels.” The calculation of the daylight factors here uses direct daylight factors, to make the forecast as simple as possible. Also, the three-dimensional angular projection factor is assumed to be equal to the daylight factor. The transparency of the window and the reflectance of the ceiling are not considered, but they are factors that could influence the interior lighting environment, so they should be considered in planning.

Reference 1) Calculation chart for a window in one wall



Reference 2) Calculation chart for a skylight



■Bibliography 9）

● 3.1.2 Openings by Orientation

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties - Inapplicable

Residential and Accommodation Sections	
Building type	Apt
Level 1	No south-facing windows.
Level 2	(Inapplicable)
Level 3	South-facing windows.
Level 4	(Inapplicable)
Level 5	South and east-facing windows.

□ Commentary

Evaluate whether the positions (orientations) of openings make efficient use of daylight.
For a dwelling with the most common room layout on the standard floor, make a total assessment of the one dwelling. The Housing Performance Indication System calculates numerical opening ratios in each direction, but for this assessment it will be sufficient to say whether there are openings in each direction

■Bibliography 8）

● 3.1.3 Daylight Devices

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There are no daylight devices.
Level 4	There is one type of daylight device.
Level 5	There are two or more types of daylight device, or they have advanced functions.
Building type	Rtl・Rst・Hsp・Htl・Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)）
Level 3	There are no daylight devices
Level 4	(Inapplicable)
Level 5	There are some daylight devices.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There are no daylight devices
Level 4	(Inapplicable)
Level 5	There are some daylight devices.

☐ Commentary

Evaluate the openings according to the planned installation of daylight devices.
Other than the windows normally installed in the exterior walls of the building, daylight devices are equipment that is installed with the intent of making greater use of daylight, such as light shelves, light ducts, gradation blinds, condensers and optical fibers. Devices with advanced functions, for example, devices which have the two functions of collecting light and guiding it to the interior of a room, such as those which combine light condensers and optical fibers.

● 3.2 Anti-glare Measures

● 3.2.1 Glare from Light Fixtures

Inapplicable at the Preliminary Design Stage.

● 3.2.2 Daylight Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Apt・Fct
Level 1	Nothing.
Level 2	(Inapplicable)
Level 3	Controlled by blinds.
Level 4	(Inapplicable)
Level 5	Controlled by eaves and blinds.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Nothing.
Level 2	(Inapplicable)
Level 3	Controlled by blinds.
Level 4	(Inapplicable)
Level 5	Controlled by eaves and blinds.

☐ Commentary

Evaluate measures against glare from direct sunlight according to whether there are curtains, blinds and eaves around the openings. The state and degree of glare should be considered for the hours of direct insolation, while the space concerned is occupied, used for work or otherwise in use. The assessment improves with the number of functions for blocking direct sunlight.

● 3.3 Illuminance Level

● 3.3.1 Illuminance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Hsp・Htl・Apt・Fct	Sch
Level 1	Less than 500lx	Less than 400lx
Level 2	500lx or more, less than 600lx	400lx or more, less than 500lx
Level 3	600lx or more, less than 750lx, or 1,500lx or more	500lx or more, less than 600lx, or 1,000lx or more
Level 4	750lx or more, less than 1,000lx	600lx or more, less than 750lx
Level 5	1,000lx or more, less than 1,500lx	750lx or more, less than 1,000lx

Residential and Accommodation Sections		
Building type	Hsp	Htl・Apt
Level 1	Less than 150lx	Less than 100lx
Level 2	(Inapplicable)	(Inapplicable)
Level 3	150lx or more	100lx or more
Level 4	(Inapplicable)	(Inapplicable)
Level 5	(Inapplicable)	(Inapplicable)

□ Commentary

Evaluate the brightness of a desktop (80cm above the floor) in the center of the room in daytime in terms of illuminance (in lux). 1,500lx or more (1,000lx or more in a school) is too bright and will result in a lower assessment. If the hours of usage of “Schools” etc. are limited to daylight hours, the brightness used should take into account the minimum level of daylight.

■Bibliography 10),11)

● 3.3.2 Uniformity Ratio of Illuminance

Inapplicable at the Preliminary Design Stage.

● 3.4 Lighting Controllability

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Hsp・Htl・Apt・Fct
Level 1	No lighting control is possible.
Level 2	(Inapplicable)
Level 3	Crude lighting control is possible in working rooms, sales areas etc.
Level 4	(Inapplicable)
Level 5	Detailed lighting control is possible in individual working rooms, sales areas etc.

Residential and Accommodation Sections	
Building type	Hsp
Level 1	No lighting control is possible.
Level 2	(Inapplicable)
Level 3	Crude lighting control is possible in units of several beds
Level 4	(Inapplicable)
Level 5	Detailed lighting control is possible for individual bed units.
Building type	Htl・Apt
Level 1	No lighting control is possible.
Level 2	(Inapplicable)
Level 3	Crude lighting control is possible in the entire room
Level 4	(Inapplicable)
Level 5	Detailed lighting control is possible in several areas of the room.

☐ Commentary

Lighting control refers to the level of control which the room occupant can personally exercise by switching lights on and off and adjusting their brightness and positions.

Evaluate the smallest possible range of lighting control in the subject space. The more intricately the lighting can be controlled, the higher the assessment.

● 4. Air Quality

● 4.1 Source Control

● 4.1.1 Chemical Pollutants Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Satisfy the Building Standards Law.
Level 4	Satisfies the Building Standards Law, and nearly all materials used (at least 70% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS F☆☆☆☆).
Level 5	Satisfies the Building Standards Law, and nearly all materials used (at least 90% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS F☆☆☆☆). Furthermore, construction materials used throughout have low emission levels of VOCs other than formaldehyde.

Residential and Accommodation Sections	
Building type	Hsp･Htl･Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Satisfies the Building Standards Law.
Level 4	Satisfies the Building Standards Law, and nearly all materials used (at least 70% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS F☆☆☆☆).
Level 5	Satisfies the Building Standards Law, and nearly all materials used (at least 90% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS F☆☆☆☆). Furthermore, construction materials used throughout have low emission levels of VOCs other than formaldehyde.

□ Commentary

Evaluate whether adequate measures have been taken to avoid air pollution by chemical pollutants.
Since the 1980s, Sick Building Syndrome has become a major problem in Europe and North America. It was triggered by changes in the materials used in buildings and a rapid reduction in the volume of air ventilation, which was intended to save energy in offices. In Japan the existence of the Law for Maintenance of Sanitation in Buildings has prevented Sick Building Syndrome from becoming such an extreme phenomenon. Instead, Sick House Syndrome has become a major problem in houses which rely on natural ventilation, and the problem has even emerged in "sick schools." The Ministry of Health, Labor and Welfare of Japan has responded by publishing concentration guideline values for chemical pollutants and pursuing various avenues of research, leading to the revision of the Building Standards Law.
For this assessment, an ordinary level of design that satisfies the Building Standard Law, which is mainly derived from consideration of chemical pollutants, receives a level 3 score. More strenuous efforts will be awarded higher scores. Level four will be awarded in cases where nearly all materials used (at least 70% by area of floors, walls and ceilings) are of high standards, compared to current regulations (JIS/ JAS F☆☆☆☆). Level 5 requires a level closer to perfection, using high level materials throughout (at least 90% by area of floors, walls and ceilings). The materials must also have low emission levels of VOCs other than formaldehyde.

■Bibliography 11),12),13),14)

● 4.1.2 Mineral Fiber

Inapplicable at the Preliminary Design Stage.

● 4.1.3 Mites, Mold etc.

Inapplicable at the Preliminary Design Stage.

● 4.1.4 Legionella

Inapplicable at the Preliminary Design Stage.

● 4.2 Ventilation

● 4.2.1 Ventilation Rate

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	For rooms equipped with centrally-managed air mixing equipment, the adequate ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the minimum to satisfy the Building Standards Law.
Level 4	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.2 times that required minimum to satisfy the Building Standards Law.
Level 5	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.4 times that required minimum to satisfy the Building Standards Law.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	For rooms equipped with centrally-managed air mixing equipment, the adequate ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the minimum to satisfy the Building Standards Law.
Level 4	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.2 times that required minimum to satisfy the Building Standards Law.
Level 5	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.4 times that required minimum to satisfy the Building Standards Law.

☐ Commentary

Evaluate according to whether there is an adequate volume of ventilation.

Level 3 is awarded for a level of ventilation that barely satisfies the Building Standards Law and the SHASE-102-1997 Ventilation Standard and Commentary. Higher levels are awarded for conscious efforts to raise air quality to higher standards. Ventilation rate is used as the indicator here, but in practice, planning for localized extraction at pollution sources is also important. For example, in an office building, the zones which generate pollutants, such as the cafeteria, graphics preparation spaces and print rooms, require measures such as ventilation systems able to isolate them entirely from the offices.

■Bibliography 12),15)

● 4.2.2 Natural Ventilation Performance Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There are no effective openings for natural ventilation in rooms where windows cannot be opened. Or in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/20 the floor area of the room.
Level 4	In rooms with unopenable windows, the area of effective openings for natural ventilation is at least $50cm^2/m^2$ of floor area. Or in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/15 the floor area of the room.
Level 5	In rooms with unopenable windows, the area of effective openings for natural ventilation is at least $100cm^2/m^2$ of floor area. Or, in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/10 the floor area of the room.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	In a building with ventilation equipment, there are no effective openings for natural ventilation in rooms. Or in a building with no ventilation equipment, the rooms in Residential and Accommodation Section have openable windows available for at least 1/20 of the floor area of the room.
Level 4	In a building with ventilation equipment, the rooms in Residential and Accommodation Section have openable windows available for at least $50cm^2/m^2$ of the floor area of the room. Or in a building with no ventilation equipment, the rooms in Residential and Accommodation Section have openable windows available for at least 1/15 of the floor area of the room.
Level 5	In a building with ventilation equipment, the rooms in Residential and Accommodation Section have openable windows available for at least $100cm^2/m^2$ of the floor area of the room. Or in a building with no ventilation equipment, the rooms in Residential and Accommodation Section have openable windows available for at least 1/10 of the floor area of the room.
Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Openable windows are available for at least 1/10 of the floor area of residential and accommodation sections.
Level 4	Openable windows are available for at least 1/8 of the floor area of residential and accommodation sections.
Level 5	Openable windows are available for at least 1/6 of the floor area of residential and accommodation sections.

□ Commentary

Evaluate whether enough openable windows are provided.

It is basically a precondition that air conditioning and ventilation equipment should provide the necessary volume of outside air. Nevertheless, there are still cases where the usage of a room causes pollutant emission to temporarily exceed expectations, or where the pollutant concentration is no problem, but occupants' physical condition or other factors make them want to temporarily improve air quality by bringing in outside air. Opening windows to bring in natural ventilation is important, as it gives occupants the power to control ventilation for their own needs at will. Smoke vents are designed to operate on natural ventilation, so if they can be opened and shut easily and the occupants can use that at will at any time, they can be regarded as natural ventilation openings for this purpose.

■Bibliography 16),17)

● 4.2.3 Consideration of Outside Air Intake

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 3m away.
Level 4	(Inapplicable)
Level 5	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 6m away.
Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(Inapplicable)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 3m away.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 3m away.
Level 4	(Inapplicable)
Level 5	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 6m away.
Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(Inapplicable)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 3m away.

☐ Commentary

Outside air intakes should be designed to take in the best outside air available. Sources of pollution include

vehicles, factories, adjacent buildings, the air conditioning and ventilation vents and heat vents of the building itself, cooling towers and garbage collection areas.

■Bibliography 18）

● 4.2.4 Air Supply Planning

Inapplicable at the Preliminary Design Stage.

● 4.3 Operation Plan

● 4.3.1 CO_2 Monitoring

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Sch･Rtl･Rst･Hal･Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The system is based on manual monitoring.
Level 4	(Inapplicable)
Level 5	The system has constant central monitoring of CO_2 to maintain air quality.

□ Commentary

Under the Law for Maintenance of Sanitation in Buildings, CO_2 monitoring is to consist of regular manual monitoring, but constant monitoring that can be accompanied by adjustment is desirable. There are variations over time and between seasons in the quality of indoor and outside air, and temporary malfunctions of the equipment can also occur. Therefore a constant monitoring system for CO_2 is desirable wherever possible.

■Bibliography 19）

● 4.3.2 Control of Smoking

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There is a minimum level of measures such as smoking booths to avoid exposing non-smokers to smoke.
Level 4	(Inapplicable)
Level 5	Smoking is confirmed to be prohibited in the entire building. Alternatively, there is an adequate level of measures such as smoking booths to avoid exposing non-smokers to smoke.

□ Commentary

Tobacco smoke contains many pollutants, including nicotine, carbon monoxide and particulates, causing the problem of passive smoking of smoke from smokers and their cigarettes. At the same time, there is a problem of the odor of tobacco smoke. Therefore as a minimum measure there should be smoking booths with direct extraction of smoke to the outside, with no recirculation to other indoor spaces. For level 5, smoking must be prohibited in the entire building, or, if there are smoking booths, they must be entirely isolated from other spaces, including via ceiling voids, to prevent any smoke dispersion to other space, with a constant negative pressure maintained in them.

■Bibliography 19）

Q-2 Quality of Service

When evaluating “Hospitals,” “Hotels” and “Apartments” for Q-2, evaluate the common properties of each building (hospital outpatient waiting rooms, hotel lobbies, apartment entrance halls etc.). For private areas, (hospital bedrooms, hotel guest rooms, apartment houses), base the assessment on assessment of Residential and Accommodation Sections.

● 1. Service Ability

Evaluate the service functions of the building for the service ability and ease of use of its spaces and, in a more positive sense, how pleasant and comfortable it is.

● 1.1 Functionality & Usability

Evaluate the service functions of the building for the service ability and ease of use of its spaces and, in a more positive sense, how pleasant and comfortable it is.

● 1.1.1 Provision of Space & Storage

Off · Sch · Rtl · Rst · Hal · Hsp · Htl · Apt · Fct

Entire Building and Common Properties	
Building type	Off · Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Working space* per person is at least 6m^2.
Level 4	Working space* per person is at least 9m^2.
Level 5	Working space* per person is at least 12m^2.

Residential and Accommodation Sections	
Building type	Hsp
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Private rooms at least 8m^2/bed, multi-bed rooms at least 6m^2/bed.
Level 4	(Inapplicable)
Level 5	Private rooms at least 10m^2/bed, multi-bed rooms at least 8m^2/bed.
Building type	Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Single room at least 15m^2, twin room at least 22m^2.
Level 4	Single room at least 22m^2, twin room at least 32m^2.
Level 5	Single room at least 30m^2, twin room at least 40m^2.

☐ Commentary

The primary aspect of interior functionality and ease of use concerns spaciousness and storage capacity. The spaciousness used here as an assessment indicator is not necessarily directly linked to functionality and storage space, but its effects, such as giving more freedom in layout of fixtures and allowing enough space for storage, can easily be imagined. Level 3 is the bare minimum currently required by related regulations in normal circumstances, while level 5 is regarded as extremely spacious, with reference to past examples.

*Working space refers to floor area allocated within the effective floor area of the office for ordinary workers to go about their daily duties. It does not include common spaces such as canteens, medical rooms, conference rooms, meeting rooms, private executive offices, filing rooms, space for refreshment (see 1.2.2) and similar spaces. Therefore, the working space includes meeting spaces (spaces for day-to-day discussions), OA equipment spaces, management spaces, circulation spaces etc.

■Bibliography 17),20),21),22)

- 1.1.2 Adaptation of Building & Services to IT Innovation

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Measures such as OA floors*[4] accommodate layout changes, and electrical sockets for OA equipment have at least 30VA/ m^2 socket capacity.
Level 4	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 40VA/m^2 socket capacity.
Level 5	In addition to OA floors, measures such as pre-wiring*[5] are used to facilitate layout changes. Also, electrical sockets for OA equipment have at least 50VA/m^2 socket capacity.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

In a highly computerized society, the installation of IT equipment is essential for all functional space in buildings. However, in non-office buildings there is a wide range of available methods, so assessment here will only cover offices. Measures in offices should go beyond just increasing the capacity of the sockets. As much consideration as possible should be given to the building and its services to facilitate the addition of IT equipment, and the relocation of such equipment for layout changes. Level 3 is the level currently demanded in normal circumstances, while level 5 requires a more active approach.

■Bibliography 20),21)

[4] A floors etc. refers to overlay-type OA floors. Other methods having the same functions can also be assessed.
[5] Pre-wiring refers to laying wiring in advance to enable easy layout changes.

● 1.1.3 Barrier-free Planning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Rtl・Rst・Hal・Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The building satisfies the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 4	The building satisfies the incentive standard for barrier-free (the preferred level) under the Barrier-free Building Law.
Level 5	The building exceeds the incentive standard for barrier-free (the preferred level) under the Barrier-free Building Law, achieving the universal design level.
Building type	Off・Sch・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The building satisfies at least half of the items of the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 4	The building satisfies the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 5	The building satisfies the incentive standard for barrier-free (the preferred level) under the Barrier-free Building Law.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Functional building space must be open to all people who have the possibility of using it. The Barrier-free Building Law (Law Concerning the Promotion of the Construction of Special Buildings that Can Be Used Easily by the Elderly and Handicapped Persons) makes the standard for barrier-free (the minimum level) mandatory for all buildings used by the general public with floor areas of 2,000m^2 or more, such as “Retailers,” “Restaurants,” “Hospitals” and “Hotels.” The minimum standard requires the elimination of barriers to the use of the building. As a mandatory goal to work towards, there is also the incentive standard for barrier-free (the preferred level), which is intended to allow the use of the building without significant impediment.

■Bibliography 23）,24）,25）

● 1.2 Amenity

● 1.2.1 Perceived Spaciousness & Access to View Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The ceiling height is at least 2.5m in offices, and the windows are arranged to give all workers an adequate awareness of the outside.
Level 4	The ceiling height is at least 2.7m in offices, and the windows are placed to give all workers an adequate awareness of the outside.
Level 5	The ceiling height is at least 2.9m in offices, and the windows are placed to give all workers an adequate awareness of the outside.
Building type	Sch
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Classroom ceiling height is at least 3m.
Level 4	Classroom ceiling height is at least 3.1m.
Level 5	Classroom ceiling height is at least 3.2m.
Building type	Rtl・Rst
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Sales area ceiling height is at least 3m.
Level 4	Sales area ceiling height is at least 3.3m.
Level 5	Sales area ceiling height is at least 3.6m.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Ceiling height at least 2.3m in Residential and Accommodation Sections.
Level 4	Ceiling height at least 2.5m in Residential and Accommodation Sections.
Level 5	Ceiling height at least 2.7m in Residential and Accommodation Sections.

☐ Commentary

Buildings should be evaluated by considering psychological comfort of spaces that are perceived as spacious by their users and offer them good views. The ceiling height indicator used here is not necessarily directly explanatory of comfort, but it appears to be effective in imparting various benefits, such as a sense of space and openness. Level 3 is the bare minimum currently required by related regulations in normal circumstances, while level 5 is regarded as extremely high, with reference to past examples.

■Bibliography 17),20),21),22)

● 1.2.2 Space for Refreshment

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Smoking areas are provided.
Level 4	Space for refreshment* is provided that is separate from smoking areas.
Level 5	Space for refreshment* is provided that is separate from smoking areas, and it is equipped with beverage vending machines and similar equipment.
Building type	Rtl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Rest space is at least 2% of the sales floor area.
Level 4	Rest space is at least 3% of the sales floor area.
Level 5	Rest space is at least 4% of the sales floor area.

*When space for refreshment is divided from working space by partitions, plants or other elements, it must be excluded from the working space floor area evaluated in 1.1.1.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Office work is often highly stressful, and with the increasing use of IT there is more time spent concentrating on the computer screen. The ability to go for relaxation and refreshment is essential for comfortable office life. Space for refreshment in offices generate new vitality in occupants. Many users spend extended periods in retail facilities, so a generous allowance of rest space for them would enhance their comfort. Level 3 can be awarded even if smoking areas are not provided, if building-wide prohibition of smoking is assumed for offices.

■Bibliography 20),21),26)

● 1.2.3 Décor Planning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There has been some degree of interior décor planning, such as color planning of wallpaper and carpets.
Level 4	(Inapplicable)
Level 5	There has been careful interior décor planning, such as color planning of wallpaper and carpets.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There has been some degree of interior décor planning, such as color planning of wallpaper and carpets.
Level 4	(Inapplicable)
Level 5	There has been careful interior décor planning, such as color planning of wallpaper and carpets.

□ Commentary

There is no general standard for interior planning, so it is very difficult to evaluate this item. However, it is an essential assessment item for the creation of attractive and pleasant spaces. For this assessment, for example, simple matching of wallpaper and carpet colors without any more advanced efforts would earn level 3. Level 5 would be based on more active efforts and a perception of the interior as a living space, with an effort to combine harmony with variation through, for example, use of multiple hues of the same color, or the use of wood and other natural materials to create a home-like atmosphere.

■Bibliography 20),26)

● 2. Durability & Reliability

● 2.1 Earthquake Resistance

● 2.1.1 Earthquake-resistance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The building's earthquake resistance meets the requirements of the Building Standards Law.
Level 4	The building's earthquake resistance exceeds the requirements of the Building Standards Law by a 20% margin.
Level 5	The building's earthquake resistance exceeds the requirements of the Building Standards Law by a 50% margin. Alternatively, damage control design has been used.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
"Earthquake resistance meets the requirements of the Building Standards Law" is set as level 3. Accordingly, levels 1 and 2 are not set, because they would represent violations and are not practically available as design options. With the earthquake resistance stipulated by the Building Standards Law as level 3, a 20% increase from that resistance earns level 4 and a 50% increase earns level 5. If damage control design has been used, it is assigned level 5, as it is regarded as guaranteeing a high level of earthquake resistance.
When designers evaluate this item, they must refer to parts of the structural calculation records, so consultation with the structural engineer is advised.

● 2.1.2 Seismic Isolation & Vibration Damping Systems

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No seismic isolation or vibration damping system is used.
Level 4	A vibration damping system is used.
Level 5	A seismic isolation system is used.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
If there is a seismic isolation system, the building is evaluated as level 5, because the protection of internal equipment is almost completely assured. Vibration damping intended to improve comfort during strong winds is rated level 4. Vibration damping elements, such as elastoplastic dampers, can help to improve the earthquake resistance of any frame, but they should be evaluated under 2.1.1 Earthquake Resistance, as damage control design. (Systems that mainly target earthquakes are named "earthquake damping" and others are named "vibration damping"). When designers evaluate this item, they must refer to parts of the structural calculation records, so consultation with the structural engineer is advised.

● 2.2 Service Life of Components

The service life evaluated here is not the social lifespan of construction materials (for example, the service life of construction materials used in a project with a limited lifespan ends when the period of use of the building expires), but rather, the service life until the building materials and equipment become dilapidated or loses their required physical functions. Thus the "necessary renewal interval" evaluated here refers to the interval before the physical durability of the materials and equipment is exhausted, and replacement is required. The set service life of components should ideally be identified in detail by the assessor from the life cycle plan for the construction production, examining the tenure of use of each category of materials. If the documentation is unavailable for that purpose, the assessor should refer to appendix 1 Table of Service Lives of Major Building Elements" (Survey Report on Service Lives of Building Structural Elements, Components, Equipment and Other Elements, 1998). In this documentation there may be differing service life figures for the same component, so when quoting a figure, the assessor should state the reason and basis for doing so.

- 2.2.1 Necessary Refurbishment Interval for Exterior Finishes

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct	
Level 1	Necessary renewal/ refurbishment interval for exterior finishes	Less than 10 years
Level 2	Necessary renewal/ refurbishment interval for exterior finishes	10 years or more, less than 20 years
Level 3	Necessary renewal/ refurbishment interval for exterior finishes	20 years
Level 4	Necessary renewal/ refurbishment interval for exterior finishes	21 years or more, less than 30 years
Level 5	Necessary renewal/ refurbishment interval for exterior finishes	30 years or more

Residential and Accommodation Sections - Inapplicable

□ Commentary

The "Necessary refurbishment interval for exterior finishes" referred to here is the interval at which failure of exterior walls to fulfill their functions necessitates repair works, with the erection of scaffolding, to maintain function. At present, no generally applicable data has been collated for necessary refurbishment interval for exterior finishes, but the data in appendix 1 has been drawn from a number of sources. The assessor should select appropriate figures for exterior walls and curtain walls from appendix 1 as reference values on which to base the assessment.

■Bibliography 27）

- 2.2.2 Necessary Renewal Interval for Main Interior Finishes

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct	
Level 1	Necessary refurbishment interval for major interior finishes	Less than 5 years
Level 2	Necessary refurbishment interval for major interior finishes	5 yesrs or more, less than 10 years
Level 3	Necessary refurbishment interval for major interior finishes	10 years
Level 4	Necessary refurbishment interval for major interior finishes	11 years or more, less than 20 years
Level 5	Necessary refurbishment interval for major interior finishes	20 years or more
Building type	Apt	
Level 1	Necessary refurbishment interval for major interior finishes	Less than 10 years
Level 2	Necessary refurbishment interval for major interior finishes	10 years or more, less than 15 years
Level 3	Necessary refurbishment interval for major interior finishes	15 years
Level 4	Necessary refurbishment interval for major interior finishes	16 years or more, less than 25 years
Level 5	Necessary refurbishment interval for major interior finishes	25 years or more

Residential and Accommodation Sections - Inapplicable

☐ Commentary

The "Necessary refurbishment interval for major interior finishes" referred to here is the interval at which internal surface finishes require re-covering or replacement of surface materials. At present, no generally applicable data has been collated for the necessary refurbishment interval for interior finishes, but the data in appendix 1 has been drawn from a number of sources. The assessor should select appropriate figures for floors, interior walls and ceilings from appendix 1 as reference values on which to base the assessment. For “Hospitals,” “Hotels” and “Apartments,” this assessment should be carried out for the interiors of hospital bedrooms, hotel guest rooms, apartment houses and other main occupied interiors.

- 2.2.3 Necessary Renewal Interval for Plumbing & Wiring Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct	
Level 1	(Inapplicable)	
Level 2	(Inapplicable)	
Level 3	Necessary renewal interval for plumbing and wiring materials	15 years
Level 4	Necessary renewal interval for plumbing and wiring materials	16 years or more, less than 30 years
Level 5	Necessary renewal interval for plumbing and wiring materials	30 years or more

Residential and Accommodation Sections - Inapplicable

☐Commentary

At present, no generally applicable data has been collated for the necessary renewal intervals for plumbing and wiring materials, but appendix 1 shows replacement intervals for each material, as reference values. The assessor should select appropriate figures for wiring conduits (electrical equipment), pipes (mechanical equipment) and ducts (mechanical equipment) from appendix 1 as reference values on which to base the assessment.

■Bibliography 27）

- 2.2.4 Necessary Renewal Interval for Major Equipment & Services

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct	
Level 1	Necessary renewal interval for major equipment and services	Less than 7 years
Level 2	Necessary renewal interval for major equipment and services	7 or more, less than 15 years
Level 3	Necessary renewal interval for major equipment and services	15 years
Level 4	Necessary renewal interval for major equipment and services	16 years or more, less than 30 years
Level 5	Necessary renewal interval for major equipment and services	30 years or more

Residential and Accommodation Sections – Inapplicable

□ Commentary
"Major equipment and services" refers to the following devices.
1) For building types other than “Apartments,” this refers to major equipment and services necessary for the building to function, specifically power receiver and transformer equipment, generators, boilers, chillers, air conditioners, water tanks, pumps and other equipment.
2) For “Apartments,” it refers to the devices necessary for people to live in the building, such as water heaters, room air conditioning, water tank and pumps.

The "Necessary renewal interval for major equipment and services" refers to the interval at which major equipment and services must be renewed or replaced. The legal minimum service life of 15 years is taken as a guideline for the necessary renewal interval for major equipment and services, so that a renewal cycle (interval) of 15 years is level 3, 16~30 years is level 4 and 30 years or more is level 5. At present no generally applicable data has been collated, but appendix 1 shows replacement intervals for each material, as reference values. The assessor should select appropriate figures for electrical equipment and mechanical equipment from appendix 1 on which to base the assessment.

■Bibliography 27）

● 2.3 Reliability

Reliability expresses the ability of the building to maintain its functions in the event of an earthquake, other natural disaster or major accident. The items 1)~5) below are evaluated here for the extent to which their functions can be maintained in the event of an earthquake or other disaster. 1) HVAC system, 2) water supply and drainage, 3) electrical equipment, 4) support method of machines and ducts, 5) communications and IT equipment. The reliability levels are set according to the basic principles below, with reference to the characteristics of the evaluated items.

Level 1: No efforts to maintain functions.
Level 3: The effects of measures taken will maintain a minimum level of equipment function in the event of a disaster.
Level 4: The effects of measures taken will maintain a partial level of equipment function in the event of a disaster.
Level 5: The effects of measures taken will maintain a largely normal level of equipment function in the event of a disaster.

● 2.3.1 HVAC System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hal・Hsp・Htl・Fct
Level 1	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated. Alternatively, there is no centralized air conditioning and ventilation equipment.
Level 4	Applicable to two of the efforts to be evaluated.
Level 5	Applicable to three or more of the efforts to be evaluated.
Building type	Sch・Rtl・Rst・Apt
Level 1	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated. Alternatively, there is no centralized air conditioning and ventilation equipment.
Level 4	(Inapplicable)
Level 5	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of HVAC system

Select from among the methods listed below, if the air conditioning and ventilation equipment has an operation control system for multiple occupied rooms.

NO.	Efforts to be evaluated
1	Circuits are divided according to the importance of their ventilation equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the ventilation with reduced load capacity have been examined.
2	Dispersion and duplication of heat source types (electricity, gas etc.), with backups
3	Countermeasures (such as suspended pipes) have been taken to ensure that overall function can continue even when the building is partially damaged by an earthquake.
4	Circuits are divided according to the importance of their air conditioning equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the air conditioning with reduced load capacity have been planned.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

This assessment item concerns buildings with central HVAC system. Buildings which do not have centrally managed systems are set at level 3.

● 2.3.2 Water Supply & Drainage

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Hal・Hsp・Htl・Apt・Fct	Rtl・Rst
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three or more of the efforts to be evaluated.	Applicable to two or more of the efforts to be evaluated

Efforts to improve the reliability of water supply & drainage

NO.	Efforts to be evaluated
1	Water-saving equipment is used. This is limited to cases where it is used on a majority of the installed equipment. Water-saving devices are those approved as Eco Mark products, or those equivalent to water-saving equipment that is the approval standard for Eco Mark products.
2	Plumbing systems are separated as far as possible to reduce the portions that become unserviceable in the event of a disaster.
3	The building has a pit for temporary waste water storage, in case main sewerage is unavailable after a disaster.
4	The building has two separate tanks, one for water reception and one elevated tank.
5	Planning enables the use of well water, rainwater, gray water etc.
6	Provision of a rainwater storage tank to provide domestic noncommercial water in the event of a disaster. (Not applied to “Retailers” and “Restaurants.”)
7	The building is equipped with a simple filtration system allowing conversion of rainwater to potable water in the event of a disaster. (Not applied to “Retailers” and “Restaurants.”)

Residential and Accommodation Sections - Inapplicable

● 2.3.3 Electrical Equipment

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Hal・Hsp・Htl・Fct	Sch・Rtl・Rst・Apt
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three or more of the efforts to be evaluated.	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of electrical equipment

NO.	Efforts to be evaluated
1	The building is equipped with emergency generators. (Not applied to Sch・Rtl・Rst・Apt.)
2	The building is equipped with uninterruptible power source systems.
3	Power input equipment for important equipment systems has redundancy. (Not applied to Sch・Rtl・Rst・Apt.)
4	Countermeasures (i) and (ii) have been taken or (iii) applies, in order to avoid power outages due to water percolation into power supply equipment or precision machinery (such as breakers, switchboards for housings), and to avoid damage to data networks. (i) Installation of power supply equipment and precision machinery below ground is avoided. (ii) Devices to prevent the groundwater percolation (waterproof doors, waterproof panels, embankments, dry ditches) and drainage equipment (pumps etc.) are installed. (iii) No danger of water percolation.

Residential and Accommodation Sections - Inapplicable

● 2.3.4 Support Method of Machines & Ducts

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3
Level 2	(Inapplicable)
Level 3	Earthquake resistance class B
Level 4	Earthquake resistance class A
Level 5	Earthquake resistance class S

☐ Commentary

If mechanical equipment and plumbing support methods are sufficient to prevent any hazard to occupants in the event of an earthquake, the required basic standard (earthquake resistance class B) is set to level 3. Level 4 (earthquake resistance A) ensures not only that occupant safety is secured, but also that mechanical equipment and plumbing support prevents equipment important for the building type from toppling and keeps it operable. The highest standard, level 5 (earthquake resistance class S) applies if all mechanical equipment and plumbing is prevented from toppling and kept operable. The basic concepts of earthquake resistance are explained in the

table below.

■Bibliography 28),29)

Importance of the building and its equipment	Earthquake resistance class	Earthquake resistance and safety targets
Specially important grade	S	Human safety is assured and secondary damage prevented after a major earthquake. All functions are maintained securely without major repairs.
Important grade	A	Human safety is assured and secondary damage prevented after a major earthquake. Important functions are maintained securely without major repairs.
Ordinary grade	B	Human safety is assured and secondary damage prevented after a major earthquake.

● 2.3.5 Communications & IT equipment

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties		
Building type	Off･Hal･Hsp･Htl･Fct	Sch･Rtl･Rst･Apt
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three of the efforts to be evaluated.	Applicable to two of the efforts to be evaluated.

Efforts to improve the reliability of communications & IT equipment

NO.	Efforts to be evaluated
1	Communications methods are diversified, using optical fiber cable, metal cable, cellular telephone network, PHS network and others.
2	Connections are made from two telephone exchanges to secure two communications links.
3	Countermeasures (i) and (ii) have been taken or (iii) applies, in order to avoid damage to data networks due to water percolation into precision devices (data transfer equipment, relay equipment and converters. MDF, optical fiber, Ethernet etc.). (i) Installation of precision machinery below ground is avoided. (ii) Devices to prevent the groundwater percolation (waterproof doors, waterproof panels, embankments, dry ditches) and drainage equipment (pumps etc.) are installed. (iii) No danger of water percolation.

Residential and Accommodation Sections - Inapplicable

● 3. Flexibility & Adaptability

● 3.1 Spatial Margin

The building story height, form and flexibility of spaces and surplus load capacity are evaluated. In “Hospitals,” “Hotels” and “Apartments,” the most important rooms on the standard floors are residential and accommodation sections, so this item should be evaluated under Residential and Accommodation Sections.

● 3.1.1 Allowance for Story Height Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Fct
Level 1	Less than 3.3m
Level 2	3.3m or more, less than 3.5m
Level 3	3.5m or more, less than 3.7m
Level 4	3.7m or more, less than 3.9m
Level 5	3.9m or more

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Less than 3.3m
Level 2	3.3m or more, less than 3.5m
Level 3	3.5m or more, less than 3.7m
Level 4	3.7m or more, less than 3.9m
Level 5	3.9m or more
Building type	Apt
Level 1	Less than 2.7m
Level 2	2.7m or more, less than 2.8m
Level 3	2.8m or more, less than 2.9m
Level 4	2.9m or more, less than 3.0m
Level 5	3.0m or more

☐ Commentary

Evaluate whether story height would pose an obstacle to changing or reinforcing building types or equipment systems.

The setting of levels for story height are based on the considerations below.

Level 1: Changing building types and equipment is extremely difficult.
Level 2: Changing building types and equipment is difficult.
Level 3: Changing building types and equipment is moderately difficult.
Level 4: Changing building types and equipment is relatively easy.
Level 5: Changing building types and equipment is easy.

● 3.1.2 Adaptability of Floor Layout

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Fct
Level 1	Wall length ratio 0.7 or above
Level 2	Wall length ratio 0.5 or above, less than 0.7
Level 3	Wall length ratio 0.3 or above, less than 0.5
Level 4	Wall length ratio 0.1 or above, less than 0.3
Level 5	Wall length ratio less than 0.1

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Wall length ratio 0.7 or above
Level 2	Wall length ratio 0.5 or above, less than 0.7
Level 3	Wall length ratio 0.3 or above, less than 0.5
Level 4	Wall length ratio 0.1 or above, less than 0.3
Level 5	Wall length ratio less than 0.1

☐ Commentary

Wall length ratio is calculated by the following equation.

Wall length/area ratio = Length of perimeter walls (m) + length of bearing walls (m) / Exclusive area (m^2)

Evaluate according to the wall length/area ratios in major occupied rooms on standard floors.
Bearing wall length refers to walls inside major rooms. If the equipment core, elevator shaft and similar elements are not adjacent to major rooms, the bearing walls can be excluded from the calculation. The setting of levels for spatial form and flexibility of space are based on the considerations below.
Level 1: Scope for planning equipment and spaces is extremely limited by the building structure.
Level 2: Scope for planning equipment and spaces is limited by the building structure.
Level 3: There is freedom for planning equipment and spaces.
Level 4: There is ample freedom for planning equipment and spaces.
Level 5: There is a high level of freedom for planning equipment and spaces.

● 3.2 Floor Load Margin

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties			
Building type	Off・Rtl・Rst・Hal・Fct		
Level 1	(Inapplicable)		
Level 2	Major rooms	Allowable floor loading	less than 2,900N/m^2
Level 3	Major rooms	Allowable floor loading	2,900N/m^2 or more
Level 4	Major rooms	Allowable floor loading	3,500N/m^2 or more
Level 5	Major rooms	Allowable floor loading	4,500N/m^2 or more

Building type	Hal (when seatings are not fixed)		
Level 1	(Inapplicable)		
Level 2	Major rooms	Allowable floor loading	less than 3,500N/m^2
Level 3	Major rooms	Allowable floor loading	3,500N/m^2 or more
Level 4	Major rooms	Allowable floor loading	4,200N/m^2 or more
Level 5	Major rooms	Allowable floor loading	5,200N/m^2 or more
Building type	Sch		
Level 1	(Inapplicable)		
Level 2	Major rooms	Allowable floor loading	less than 2,300N/m^2
Level 3	Major rooms	Allowable floor loading	2,300N/m^2 or more
Level 4	Major rooms	Allowable floor loading	2,900N/m^2 or more
Level 5	Major rooms	Allowable floor loading	3,500N/m^2 or more

Residential and Accommodation Sections			
Building type	Hsp・Htl・Apt		
Level 1	(Inapplicable)		
Level 2	Major rooms	Allowable floor loading	less than 1,800N/m^2
Level 3	Major rooms	Allowable floor loading	1,800N/m^2 or more
Level 4	Major rooms	Allowable floor loading	2,100N/m^2 or more
Level 5	Major rooms	Allowable floor loading	2,900N/m^2 or more

☐ Commentary

The permissible load for the room concerned, as stated in article 85 of the enforcement regulations for the Building Standards Law is set as level 3, a 20% higher value is level 4 and a 50% higher value is level 5. In addition to offices, this assessment covers the sales areas of department stores and other retailers, buildings which have halls with fixed seating as their standard rooms, and school buildings which have classrooms as their standard rooms.

The permissible load for the room concerned, as stated for buildings incorporating Residential and Accommodation Sections (“Hospitals,” “Hotels”, “Apartments”) in article 85 of the enforcement regulations for the Building Standards Law, is set as level 2. One rank higher for offices is set as level 5. This allowance for load leaves potential for conversion to other uses. In practice, level 2 or below will be applicable to very few cases. Level 4 is a value interpolated between levels 3 and 5.

● 3.3 Adaptability of Facilities

● 3.3.1 Ease of Air Conditioning Duct Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Air conditioning ducts cannot be replaced without damaging structural elements.
Level 2	In some cases the air conditioning ducts can be replaced without damaging structural elements, if spare sleeves are used, but that method cannot be applied to all ducts.
Level 3	Space and routes for future use (future replacement work) have been provided, so that nearly all air conditioning ducts can be replaced without damaging structural elements. Alternatively, there is no central air conditioning equipment.
Level 4	Exterior air conditioning ducts are used or ceiling space provided so that ducts can be replaced without damaging either structural elements or surface finishes.
Level 5	ISS*[6], equipment floor installation or other measures allow easy replacement of air conditioning ducts without damaging surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Cases where there is no plan for renewal of air conditioning ducts, and ducts cannot be replaced without partial demolition of structural elements such as beam, columns and bearing walls, result in new repair works and generation of solid waste. Such cases are assigned level 1, the lowest level. Buildings where space and routes for future use (future replacement work) have been provided, so that nearly all air conditioning ducts can be replaced without damaging structural elements, are assigned level 3. If replacement work can be carried out without damage to surface finishes, level 4 or level 5 is assigned, depending on the ease of the work. Buildings with no central air conditioning equipment are assigned level 3.

● 3.3.2 Ease of Water Supply and Drain Pipe Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Pipes cannot be replaced without damaging structural elements.
Level 2	In some cases pipes can be replaced without damaging structural elements, if spare sleeves are used, but that method cannot be applied to all ducts.
Level 3	Space and routes for future use (future replacement work) have been provided, so that nearly all water supply and drain pipes can be replaced without damaging structural elements.
Level 4	Wall plumbing or ceiling space provided, so that water supply and drain pipes can be replaced without damaging either structural elements or surface finishes.
Level 5	Unit pipes, system WCs and other measures allow easy replacement of water supply and drain pipes without damaging surface finishes.

[6] ISS: Interstitial Space System. System that architecture and facilities are integrated.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Similarly to "3.3.1 Ease of Air Conditioning Duct Renewal" cases where there is no plan for renewal of water supply and drain pipes, and pipes cannot be replaced without partial demolition of structural elements such as beam, columns and bearing walls, result in new repair works and generation of solid waste. Such cases are assigned level 1, the lowest level. Buildings where space and routes for future use (future replacement work) have been provided, so that nearly all water supply and drain pipes can be replaced without damaging structural elements are assigned level 3. If replacement work can be carried out without damage to surface finishes, level 4 or level 5 is assigned, depending on the ease of the work.

● 3.3.3 Ease of Electrical Wiring Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Wiring cannot be replaced without damaging structural elements.
Level 2	(Inapplicable)
Level 3	Wiring can be replaced without damaging structural elements.
Level 4	(Inapplicable)
Level 5	Wiring can be replaced without damaging structural elements or surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Level 3 is assigned where it is possible to replace wiring without damaging structural elements.

● 3.3.4 Ease of Communications Cable Renewal

Off・Sch・Rtl・Rst・Hal・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Communications cables cannot be replaced without damaging structural elements.
Level 2	(Inapplicable)
Level 3	Communications cables can be replaced without damaging structural elements.
Level 4	(Inapplicable)
Level 5	Communications cables can be replaced without damaging structural elements or surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

The reasons for assigning levels are the same as for "3.3.3 Ease of Electrical Wiring Renewal."

● 3.3.5 Ease of Equipment Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	There are no routes or machine hatches for replacing major equipment, so it cannot be replaced without demolishing exterior walls or other elements.
Level 2	(Inapplicable)
Level 3	There are routes or machine hatches for replacing major equipment
Level 4	(Inapplicable)
Level 5	There are routes or machine hatches for replacing major equipment, and there is backup equipment (or machine that has a backup function) to be used during the replacement period.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Evaluate according to whether routes, machine hatches and other spaces have been provided to allow passage of equipment for replacement.

The term "major equipment" refers to the following equipment.

1) For building types other than “Apartments,” this refers to major equipment and services necessary for the building to function, specifically power receiver and transformer equipment, generators, boilers, chillers, air conditioners, water tanks, pumps and other equipment.
2) For “Apartments,” it refers to the devices necessary for people to live in the building, such as water heaters, room air conditioning, water tank and pumps.

● 3.3.6 Provision of Backup Space

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There is no planned provision of space for backup equipment.
Level 4	There is planned provision of space for backup equipment.
Level 5	(Inapplicable)

Residential and Accommodation Sections - Inapplicable

☐ Commentary

If the plan for equipment replacement works secures space to install backup equipment, the building's functions can be maintained while the replacement takes place. Therefore, if plans have been made for securing backup space, the assessment is level 4.

Q-3 Outdoor Environment on Site

For assessment of Q-3, the assessor assigns credits according to the level of each listed effort shown in the Efforts to Be Evaluated for scoring items. The total number of credits is converted to a credit ratio for scoring and evaluated on a five-level scale. The specific method is described below. As most of the assessment items under Q-3 are qualitative, therefore the content of the efforts made and comments need to be described separately in the “Brief summary of Design for Environment ” column prepared in the scoring software.

[Scoring method]

1) Evaluate the content of items in the Efforts to be evaluated, according to the actual planned level (the target level if the assessment is at the planning stage), on a three-level scale (High, Low, None). For some items there are only two levels.
   *Some points can be selected as “Exclude,” according to factors such as the building types and site conditions. The cases which are to be excluded are stated in the commentary for each point. Select "Exclude" on the scoring software, and the item concerned will be automatically excluded from the scoring subjects.
2) Record the total for all evaluated items in the (1) Total Credits space.
3) Enter the maximum total score for all evaluated items (omitting those items which have been excluded) in the (2) Maximum Score space.
4) Calculate ratio of (1) Total Credits to (2) Maximum Credits as (1)/(2) and record the result in the (3) Credit Ratio space.
5) Refer to the levels 1~5 shown in the scoring criteria, select the level corresponding to the (3) Credit Ratio and use that level as the assessment.

When the assessor has entered the credits for each item in the scoring software, (1) Total Credits, (2) Maximum Credits and (3) Credit Ratio will be calculated automatically.

● 1. Preservation & Creation of Biotope

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the efforts to be evaluated, 0≦Credit Ratio <0.2
Level 2	On the efforts to be evaluated,, 0.2≦Credit Ratio <0.4
Level 3	On the efforts to be evaluated,, 0.4≦Credit Ratio <0.6
Level 4	On the efforts to be evaluated,, 0.6≦Credit Ratio <0.8
Level 5	On the efforts to be evaluated,, 0.8≦Credit Ratio

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	I. A survey has been made of surrounding habitat (state of inhabiting flora and fauna, etc.)
2	1	0	II. Conservation of existing ecological resources (conservation of existing topography, topsoil, trees, bodies of water etc.)
2	1	0	III. Extensive greening 1) Thorough greening of exterior (surface) on site
2	1	0	2) Greening the building (roofs and walls)
2	1	0	3) Landscaping of green space (placement of continuous green land and voluminous vegetation to form ecological networks in the local area)
2	1	0	4) Consideration for living habitat for small animals (planting of feed trees, biotopes and use of porous materials etc.)
2	1	0	IV. Preparation of monitoring plan and management of flora and fauna habitat
2	1	0	V. Efforts to improve contacts between users and flora and fauna (creation of water parks and other contact spaces, and provision of information on related measures, etc.)

2	1	-	VI. Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

I. A survey has been made of surrounding habitat

Points should be awarded if any ecological survey of the site's surroundings has been carried out before planning, with the results being reflected in the plans. Set to “High” if a wide-area survey was carried out that extended beyond the site and its immediate surroundings.

II. Conservation of existing ecological resources

The subjects for assessment under this item include topography, topsoil, trees, green space and waterside areas. These are areas where constant habitats have formed over long periods, and play important roles within broader regional habitats. New construction activity must physically conserve the existing topography, topsoil, trees, green space and waterside areas, and alleviate the load placed on regional habitats. Evaluate whether previous topography, topsoil, trees, green space and water park remaining on the site have been conserved. If existing resources judged from the viewpoint of local ecological conservation have been fully conserved, evaluate the conservation effort as “High,” and evaluate as “Low” if it such resources have been partially conserved. And if there is no resource to be conserved on the previous site (e.g. vacant lot), set as “Excluded.”

III Extensive greening

Green space in urban areas serves as habitat for diverse organisms to live and grow. It is necessary to act with consideration to securing adequate area and organic linkage with green space in surrounding area. Planting is needed as a deliberate effort to form networks of water and greenery in city centers that link organically to wooded hills and mountains, farmland, lakes, rivers, marshes, coastlines and other natural areas on the outskirts of cities, so that the outlying areas can supply abundant biotas to the cities. Evaluate efforts under this item from the perspectives described below.

III-1) Greening of exterior areas on site:

To secure overall green space in the entire urban areas, the quantity of greening on individual sites is evaluated. If 50% or more of the exterior space is under vegetation and planting tall tree where appropriate, evaluate the effort as “High.” If the rate is 30% or more, evaluate is as “Low.”

III-2）Greening the building

Assessment considers roof planting and wall planting. The size of the building planting index, calculated by the formula below as the ratio between the total area of roof and wall planting and the total area of the building (the plan area occupied by the building), is used as the basis of this evaluation. At this stage, calculate and enter the greening area of building as the possible greening area (e.g. the area covered by metal mesh etc. as the area of wall vine planting) at the planning stage. The building area should be taken as the legal construction area of the building concerned.

$$\text{Building planting index} = \frac{\text{Building greening area (total of roof planting and wall planting)}}{\text{Building area}}$$

High level: Building planting index of 0.2 or above.
Low level: 0.05 ≦ Building planting index <0.2

III-3）Landscaping of green space

Evaluate green space on site for its continuity within the site, its volume and other landscaping considerations with a view to its effective function as an ecological resource with the local ecology. If green space on site is formed with adequate continuity and volume, considering also the formation of ecological networks in the local area, it should be evaluated as “High,” while incomplete efforts to secure continuity and volume should be evaluated as “Low.”

III-4）Consideration for living habitat for small animals

Evaluate efforts other than 1)~3) to secure environments for small animals, in particular, to live, nest and raise young (such as the use of biotopes, planting of food-bearing trees and use of highly porous materials). Evaluate the level as "High" if there is a land usage plan which is based on an awareness of habitat for animal living and rearing on the whole site, and "Low" if the plan only covers part of the site. “Excluded” can be selected if the site do not have exterior space.

IV Preparation of monitoring plan and management of flora and fauna habitat
Evaluate whether there is a plan for maintaining a good environment for the growth of plants and animals while the building is in operation, including elements such as tree pruning, grass cutting and biotope management. Also evaluate whether there is a monitoring plan to ascertain the state of life and growth of plants and animals, and reflect the findings in an effective management plan. The generally-practiced level of management plan for planted vegetation should be rated “Low.”

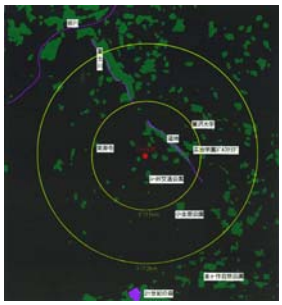
V Efforts to improve contacts between users and flora and fauna
Evaluate efforts to increase the opportunities for building users and local residents to enjoy the building’s natural environment. Assessment covers placement of resources such as waterside areas, birdwatching facilities, and greening areas that building users can use, and dissemination of information on the building's environmental measures (pamphlets, panel displays, events etc.).

■Reference 1）The National Strategy of Japan on Biodiversity and Conservation of Natural Environment
The Japanese government has been working to systematize methods for conserving the natural environment, beginning with the Basic Environment Law, and it adopted the National Strategy of Japan on Biological Diversity (note) in October 1995, as part of its promotion of efforts to conserve the natural ecology of Japan and its biodiversity, treating the country not as an expanse of land, but as a national resource extending from below ground to the air, from groundwater to the sea, and from micro-organisms to the birds of the air. As part of this effort, it recognized the importance of networking the precious natural environments remaining in urban areas with a view to reviving an environment able to support abundant biotas, and the need for appropriate conservation of remaining natural environments, combined with positive development of green infrastructure. These measures are intended to preserve a certain balance with natural ecosystems, secure habitat for small animals and promote the formation of an environment for human activity that exists side by side with nature.

＜The National Strategy of Japan on Biodiversity＞
The Basic Environment Plan was adopted by the Japanese cabinet in December 1994. The Plan was based on the Convention on Biological Diversity, which was adopted by 157 countries at the Earth Summit in Rio de Janeiro in June 1992. The National Strategy of Japan on Biodiversity was adopted in 1995 to systematize the basic approach and the policies taken by each ministry and agency to carry out the plan.

■Reference 2）Example of formation of ecological networks
○Eco Village Matsudo (Environment-conscious group housing oriented to community symbiosis)

The site design was based on ecological planning (water, vegetation, wind) drawn up through wide-area environmental analysis, and it reflected the characteristics of local ecosystems and the wind environment. An analysis of a 5km square around the site, to identify the distribution of green space, showed “planar biotopes” formed of large-scale green space and bodies of water, while the wetlands of the Fuji river formed a “linear biotope,” and “stepping-stone biotopes” were formed by shrine and temple woods, green slopes and small parks. Among these biotopes, elements of the project, such as the tree sanctuary and dragonfly pond, are expected to serve as a “point biotope,” strengthening wide-area ecological networks in future. Follow-up surveys continue after the completion of construction, and confirm that populations of birds, insects and other organisms are rising.



Analysis of nearby green space: "Stepping-stone" green space with high levels of activity were identified within a 5km square area.
(Photograph provided by Taisei Corporation)

● 2. Townscape & Landscape

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0≦Credit Ratio <0.2
Level 2	On the Efforts to Be Evaluated, 0.2≦Credit Ratio <0.4
Level 3	On the Efforts to Be Evaluated, 0.4≦Credit Ratio <0.6
Level 4	On the Efforts to Be Evaluated, 0.6≦Credit Ratio <0.8
Level 5	On the Efforts to Be Evaluated, 0.8≦Credit Ratio

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	1) Building placement and orientation responsive to the surrounding environment
2	1	0	2) Building height and form that are responsive to the surrounding environment
2	1	0	3) Use design elements, materials and colors that are responsive to the surroundings.
2	1	0	4) Public space and exterior elements responsive to the surrounding environment
2	1	0	5) Reflecting views of local residents in plan content
2	1	-	6) Other
(1) Total Credits			(2) Maximum Credits / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

This item does not evaluate the beauty of the urban context and scenery. Instead, it evaluates how vigorously the unique regional rules about the local urban context, such as guidelines and bylaws, are applied.

The “Three Laws on Landscape and Greenery” has recently been enacted in Japan, June 2004 and the legislation of rules on urban context and scenery in individual regions is likely to accelerate in future. At present, however, few local authorities and similar bodies have adopted specific local rules, so points which should, in general, be considered are listed below. If one or more of the items below is applicable, assign a grade of “Low,” and assign “High” if three or more are applicable. And if rules exist in the region concerned, the judgment criterion should be how well rules have been followed.

1）Building placement and orientation responsive to the surrounding environment

The building should be placed so as to avoid impact on adjacent sites and roads. Also, if there are any historic building remains or natural features on the site that should be preserved, the building should be placed to avoid them.

a) Consider roads and other public spaces to avoid the impression that the building turns its back on the street.
b) Building location and orientation to preserve any historic building remains or natural features (topography, standing trees etc.) on the site that should be preserved.
c) Consideration of the position and orientation of the walls of adjacent buildings.
d) Configuration and placement of buildings with an awareness of lines of sight from the surroundings to the planned site.
e) Configuration and placement of buildings to give a feeling of depth.

2) Building height and form that are responsive to the surrounding environment

Evaluate the consideration given to form of the building, such as scale, height and balance. The plan must give particular consideration to how the building will appear from main roads and major nearby vantage points.

a) The form of the building considers the balance of the building as a whole and its balance with the forms of adjacent buildings and other scenic elements.
b) Make the spaces at the feet of residential blocks in a comfortable and accessible human scale.

c) Consider the skyline formed with surrounding building groups.
d) Consider how the building will appear when viewed from major viewpoints in the area.
e) Consider how the building will appear when viewed from major roads, and avoid producing an oppressive atmosphere by reducing the number of floors in the building facing the roads.
f) If there is equipment on the roof or top of the building, consider how it is viewed from the surroundings.
g) Consider rooftop planting on medium and low-rise buildings to create green space.
h) Use public walkways and entrance porches, provide spaces usable for gardening, and install fixtures such as hooks for hanging plants.
i) Harmonize balconies, equipment and other elements with the building as a whole.

3）Use design elements, materials and colors that are responsive to the surroundings.

Aesthetic design is a difficult field in which to regulate efforts, but surface design elements such as openings and exterior wall surfaces can be examined. Materials traditionally available in a region can be used to make the design harmonize better with the existing townscape. It is recommended to choose colors that will harmonize with the surroundings.

a) Consider the effect of the building design such as roof, openings and walls on the surrounding scenery.
b) Consider the effect of the building's color on the surrounding scenery.
c) Consider the effect of the building's exterior materials on the surrounding scenery.
d) Use materials traditionally available in a region.

4）Public space and exterior elements responsive to the surrounding environment

Open public spaces should be more open for use of general public. The scale of such space is determined by guidelines and other sources. The form can be determined with a view to continuity with adjacent open spaces, or it can be a surrounded plaza, a through route, or somehow linked into the building.

<Open public space>
a) Consider continuity with adjacent open spaces.
b) Provide amenity space that is easy to use.
c) Create courtyards and alleys to form spaces that will positively support community activities

<Greening>
d) Plant as much vegetation as is practically possible within the site, to create relaxing and appealing spaces.
e) Secure planted areas that enable strong plant growth for greening.
f) Select tree varieties carefully for greening.
g) If there is spring water on site it should be used to the full.
h) Plant green belts to mitigate impact on adjacent sites.
i) Consider harmonization with urban scenery and adjacent sites and roads.

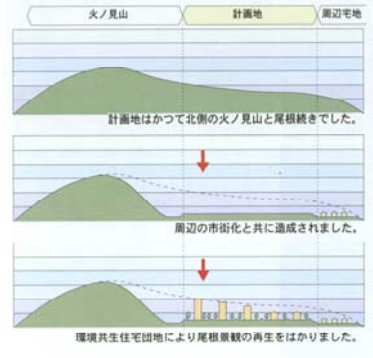
<Paving and facilities etc.>
j) Aim for consistency in facilities such as benches and street lamps.
k) Use trees and other elements to landscape horizontal expanses such as parking lots.
l) Use paved surfaces that do not appear "inorganic" when they are not covered by cars. (Planted pavement, block pavement that is responsive to the color of surroundings and etc.)

■Reference) Example for each item

1) Building placement and orientation responsive to the surrounding environment
Arranging blocks with visual depth when seen from the main road reduces the oppressive atmosphere created on the road. (Globe Court Omiya Minami-Nakano)

Apartment blocks seen from the approach palaza (Photo credit, Isao Saito)

2）Building height and form that are responsive to the surrounding environment
Placing high-rise blocks on the north side and reducing height to three floors on the east and southwest sides, adjacent to existing residential areas, mitigated the oppressive effect on those adjacent residential areas and restored the original scenery of the natural skyline.
(Shimonoseki, Ichinomiya prefectural housing)



(Diagrams provided by Yamaguchi prefecture, Department of Civil Engineering, Housing Section)

3）Use design elements, materials and colors that are responsive to the surroundings.
For external wall surface, materials traditionally available in a region are used to make the design harmonize better with the existing townscape. Such materials have relaxed tones and easily become familiar. Choose colors that will harmonize with the surroundings. In recent years there has been a trend away from primary colors towards more relaxed earth tones.

4）Public space and exterior elements responsive to the surrounding environment
A scenic simulation was used to vary ratios of evergreen to deciduous trees, forming a wide range of forest scenery while maintaining a set tree density. For areas such as parking lots, where greenery even in winter is important, the ratio was seven evergreen to three deciduous trees, while the ratio was reversed in areas of bright forest comprising mostly scrub trees.
(Noritake no Mori, Nagoya)

Spring

Summer

Autumn

Winter

(Diagram provided by Taisei Corporation)

● 3. Local Characteristics & Outdoor Amenity

● 3.1 Attention to local character & improvement of comfort

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0≦Credit Ratio(3) <0.2
Level 2	On the Efforts to Be Evaluated, 0.2≦Credit Ratio(3) <0.4
Level 3	On the Efforts to Be Evaluated, 0.4≦Credit Ratio(3) <0.6
Level 4	On the Efforts to Be Evaluated, 0.6≦Credit Ratio(3) <0.8
Level 5	On the Efforts to Be Evaluated, 0.8≦Credit Ratio(3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I. Consideration for memories of previous uses of the land and the continuation of local culture** a) The plan of the building and its exterior reflects aspects of local context, such as climate, history and culture for its function, selection of materials and operation planning.
2	1	0	b) Use of local industries, personnel and skills
2	1	-	c) Other
2	1	0	**II. Consideration of relation between interior and exterior (Mitigation of psychological stress on occupants, etc.)** d) Formation of semi-outdoor and intermediate spaces (balconies, peripheral corridors, formation of spaces to take in outside light and air movement, securing spaces for local residents to use, etc.)
2	1	0	e) Providing buffer zones (Formation of psychologically rich living spaces, sentimental expression, reconciliation between public and private, for example, entry porches for each dwelling, design measures around entrances, etc) (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	f) Other
2	1	0	**III. Consideration for community formation in local society and among residents** g) Development of community spaces and facilities that serve as centers for exchanges between residents and local society (halls, leisure rooms, community centers etc.)
2	1	0	h) Creation of spaces within the exterior space that will help to foster community relations with local residents (such as courtyard spaces open to the community)
2	1	0	i) Design of common spaces (public corridors, entrances, plazas etc.) to increase residents' contacts with local residents in daily life. (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	j) Other
2	1	0	**IV. Participation between residents and local people** k) Encouraging occupants to participate in building maintenance management.
2	1	0	l) Participation of occupants in the design process. (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	m) Other

2	1	0	**V. Improvement of health and comfort** n) Spatial design that is aware of children's growth, and consideration for the elderly and handicapped. (Applied to “Apartments” only）	
2	1	0	o) Improvement of exterior space comfort	
2	1	-	p) Otrher	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

If the points below have been addressed in some form, award “Low” level, and award “High” level if specialized efforts have been made. This item deals with qualitative matters, so the content on which the judgment is based should be specified in the “Brief Summary of Design for Environment.”

I. Consideration for memories of previous uses of the land and the continuation of local culture

There are many historical and cultural resources which reflect the unique way of life of a region or community. It is important that the building plan should discover such resources and reflect them in various forms while building a modern environment. Examples include the use of local materials, and measures which could assist in the promotion of local industries. Use of locally-produced timber is one example, but it is hard to judge what range can be considered a local market. If local authorities or other bodies have systems to promote the use of locally-produced materials, their definition should be employed.

<Continuation of memories of the past>
With replacement houses, the tiles from the old house can be used in the exterior and old wells and trees preserved and reused.
(Setagaya ward, Fukazawa Symbiotic Housing Project)

II. Consideration of relations between interior and exterior

Rather than isolating the interior of the building from the exterior, and the site from its surroundings, they can be joined attractively through intermediate and semi-outdoor spaces, with reference to the site's orientation and surrounding environment. Providing such buffer zones alleviates psychological stress for building users, creating deep, spacious and rich spaces.

For example, skillful linking of spaces such as courtyards, terraces, balconies and sunrooms, which are free and open and bring in light and breezes, with interior spaces, and partitioning them with glass doors, makes spaces that can be converted between interior and exterior, as the changing seasons permit. In apartments, the space around the entrance and the balcony area are points of contact with exterior space. This approach is also important for forming an appropriate balance between public and private. Elements such as niches, raised flower beds, pergolas and deep balconies are important in forming rich intermediate spaces that arouse sentimental responses.

Deep balconies provide space for ample vegetation
(Setagaya ward, Fukazawa Symbiotic Housing Project)

A Void brings both light and air into the rooms on the north side of the building. (Setagaya ward, Fukazawa Symbiotic Housing Project)

V. Improvement of comfort
The comfort afforded by a building goes beyond simple thermal comfort. A truly comfortable building is one that gives emotional healing, built on the basic conditions of safety and peace of mind. Therefore, this assessment considers exterior plans which include measures such as securing abundant sunlight and green space outside the building, creating inner courtyards for peaceful relaxation with privacy, or, in the case of housing, considering the living needs of children and the elderly.

● 3.2 Improvement of the Thermal Environment on Site

Off・Sch・Rtl・Rst・Hal・Apt・Hsp・Htl・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Apt・Hsp・Htl・Fct
Level 1	On the efforts to be evaluated, 0 ≦Credit Ratio(3) < 0.2
Level 2	On the efforts to be evaluated, 0.2 ≦Credit Ratio(3) < 0.4
Level 3	On the efforts to be evaluated, 0.4 ≦Credit Ratio(3) < 0.6
Level 4	On the efforts to be evaluated, 0.6 ≦Credit Ratio(3) < 0.8
Level 5	On the efforts to be evaluated, 0.8 ≦Credit Ratio(3)

Efforts to be evaluated

Level of efforts		Efforts
Present	None	
2	0	1) Using the surrounding airflow environment to encourage air movement within the site. a) Building layout designed to draw in air movement from surrounding vegetation and open space. b) Appropriate provision of open/ green space to encourage air movement. c) Formation of routes within the site to encourage air movement.
2	0	2) Providing green space, water surfaces and other elements within the site to alleviate the thermal environment. a) Provide as much green space (including tall trees) as possible on the site. b) Provide surface water on the site. c) Limit the range of use of materials with large heat capacities, such as asphalt concrete for paved surfaces etc.
2	0	3) Use building greening to alleviate the thermal environment on the site. a) Building skin planting (on open decks, balconies etc.).
2	0	4) Consider artificial heat venting positions etc. to alleviate the thermal environment on the site. a) Artificial heat venting points should be placed as high as possible. b) High-temperature heat venting points should be placed as high as possible. c) The temperature of artificial heat venting should be as low as possible.
(1) Total Credits		(2) Maximum Credits / (3) Credit Ratio [(1)/(2)] =

☐ Commentary
Evaluate efforts to alleviate the on-site thermal environment. Check whether or not any efforts have been made on the following points, and evaluate them on two levels. Efforts to improve the impact on the thermal environment around the site (L category) are covered under LR-3 ● 5 Heat Island Effect.

1) Using the surrounding airflow environment to encourage air movement within the site.
This assessment should cover cases where steps have been taken in the plans of building placement and open/green space, as measures to encourage air movement through the site.

2) Providing green space, water surfaces and other elements within the site to alleviate the thermal environment.
Measures to alleviate the on-site thermal environment include greening plans centered on tall trees, provision of open water, limitation of paved surfaces, or the selection of paving materials of low heat capacity. Evaluate such measures if they exist. In particular, efforts are required for the parking lots which commonly occupy large exterior areas. They could include greening of paved surfaces, roof planting and consideration of paved surfaces.

3) Greening the building to alleviate the thermal environment on the site.
This assessment covers greening of the building itself, through measures such as roof (doorway area) and wall planting.

4) Consider artificial heat venting positions etc. to alleviate the thermal environment on the site.
Evaluate efforts related to artificial heat venting that reduces impact within the site. Evaluate measures such as placing artificial heat venting positions as high as possible and minimizing heat discharge temperatures.

LR-1 Energy

The basis of the energy assessment method is in current laws and regulations, such as the Energy Saving Law and the Housing Quality Assurance Law. By whichever assessment method, level 3 should be equivalent to the "Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Building" laid down in the Energy Saving Law. Buildings falling short of the standard, score 1 or 2, while those with energy-saving performance above the standard, score 4 or 5.

● 1. Building Thermal Load

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl – Assessment using the specification standard (Point Value)
Level 1	(Points) < 80pts
Level 2	80pts ≦ (Points) < 100pts
Level 3	100pts ≦ (Points) < 130pts
Level 4	130pts ≦ (Points) < 160pts
Level 5	160pts ≦ (Points)
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl - Assessment using the performance standard (PAL Value)
Level 1	Compared to the standard value 5% < (PAL value)
Level 2	Compared to the standard value 0% < (PAL value) ≦ 5%
Level 3	Compared to the standard value -10% < (PAL value) ≦ 0%
Level 4	Compared to the standard value -25% < (PAL value) ≦ -10%
Level 5	Compared to the standard value (PAL value) ≦ -25%

☐Commentary

Evaluate the reduction of thermal gains and losses due to insolation and interior-exterior temperature gradients, and thermal load control as a means of reducing energy consumed by cooling and heating. For buildings other than apartments, base the assessment on PAL and other aspects of the Energy Saving Law. Assessment of apartments should be based on the Housing Quality Assurance Law.

The perspectives for assessment are as described in 1)~4) below.

1) Measures in the building site plan, such as building form and core position, to reduce thermal loads.
2) Level of use of highly insulative construction methods and materials in walls, roof and elsewhere.
3) Level of use of louvers, eaves and other sun-shading methods on windows, which should take into account seasonal variations in sun height between winter and summer.
4) Level of use of measures such as highly insulative multipane glass windows, airflow windows and double skins.

At the Preliminary Design Stage, except for apartments the range of building type under the Energy Saving Law can be extended beyond the current regulations, enabling assessment of buildings of 5,000m^2 and more under the specification standards (Point method). Therefore, either the performance standard (PAL value) or the specification standard can be used for the assessment.

■Reference 1) The Standard for Judgement by Owner Regarding the Rational Use of Energy Relating to Buildings

	Hotels	Hospitals	Retailers	Offices	Schools	Restaurants	Halls	Factories
Performance standard MJ/㎡-yr	420 or less	340 or less	380 or less	300 or less	320 or less	550 or less	550 or less	–
Specification standard	100 or more							

* The specification standard cannot handle "retail store and similar buildings in hot regions," so the performance standard should be used for calculation.

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Building type	Apt
Level 1	(Inapplicable)
Level 2	Corresponding to grade 1 insulation and airtightness of housing (Housing Quality Assurance Law): Falls short of level 3
Level 3	Corresponding to grade 2 insulation and airtightness of housing (Housing Quality Assurance Law): 1980 standards (Energy Saving Standards)
Level 4	Corresponding to grade 3 insulation and airtightness of housing (Housing Quality Assurance Law): 1992 standards (New Energy Saving Standards)
Level 5	Corresponding to grade 4 insulation and airtightness of housing (Housing Quality Assurance Law): 1999 standards (Current next-generation standards)

□ Commentary

Evaluate “Apartments,” which is stipulated by the Housing Quality Assurance Law, following grading of aspects such as home energy saving performance. Under the Housing Quality Assurance Law, the "Standard for Judgment by Owner Regarding the Rational Use of Energy Relating for Housing Operation" separate levels between the current next-generation standard (1999), the new-generation standard (1992) and the old-generation standard (1980).

■Reference 2) Comparison between residential energy-saving standards and the Housing Quality Assurance Law

Housing Quality Assurance Law	Annual heating and cooling load MJ/m^2-yr					
	I	II	III	IV	V	VI
Grade 1	(Buildings that fall short of grade 2)					
Grade 2	840 or less	980 or less	980 or less	980 or less	980 or less	980 or less
Grade 3	470 or less	610 or less	640 or less	660 or less	510 or less	420 or less
Grade 4	390 or less	390 or less	460 or less	460 or less	350 or less	290 or less

* I-VI represent regional categories.

*Other than the items above, the judgement standard contain corrected value standards for equivalent clearance area, summer solar gain coefficient and passive solar housing. (Refer to the Bibliography for details.)

The current next-generation standards go on from the previous standards on insulation performance and insolation shading performance to add assessment of passive systems for outside air loads and direct gains. For this assessment these measures are included under the Building Thermal Load item.

■Reference 3) Details of assessment items

Middle items	Specific items	Details	
Building thermal load control	Insulation performance	Annual heating and cooling load	Heat loss coefficient
	Solar-gain shading performance		Summer solar gain coefficient
	Outside air loads		Total enthalpy heat exchanger etc.
	Direct gains		Load reduction by solar gain

● 2. Natural Energy Utilization

● 2.1 Direct Use of Natural Energy

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	Of the Efforts to Be Evaluated, none of the methods is used, or used only partially.
Level 4	Of the Efforts to Be Evaluated, any of the methods is used in a majority of the building.
Level 5	Of the Efforts to Be Evaluated, two or more of the methods are used in a majority of the building.

Efforts to be evaluated

NO.	Efforts to be evaluated
1	Use of natural light: Planning for natural light systems that use sunlight in place of lighting equipment. (E.g. Light shelves, top lights, high side lights[7] etc.)
2	Use of natural ventilation: Planning for the use of natural ventilation and ventilation systems that are effective in replacing the use of air conditioning equipment and reducing cooling loads. (E.g. Automatic dampers, night purging, ventilation systems linked to atria, solar chimney ventilation towers etc.)
3	Use of geothermal energy: Planning for the use of geothermal heat usage systems that are effective in replacing the use of heat sources and air conditioning equipment and reducing heating and cooling loads. E.g. Cool and heat tubes and pits etc.
4	Miscellaneous: Planning for the effective use of nature in other systems.

☐Commentary

Evaluate the unconverted use of natural energy, such as light and ventilation. Solar cells, solar panels and other methods for converting natural energy into electricity or heat should be evaluated under 2.2 Converted use of naturalenergy.

Evaluate efforts to make direct use of natural energy, as appropriate for the scale, type and surrounding condition of building. Make a qualitative assessment of design efforts at the Preliminary Design Stage to make use of natural energy, considering the methods used, the scale of their implementation in the building and the way they are used.

If measures have been used partially, they should be evaluated as level 3, because they do not lead to practical energy-saving effects. If they are applied to a majority of the building (50% or more of the total floor area), and can be expected to yield real energy-saving effects, they should be evaluated as level 4 or 5.

Building type	Apt
Level 1	(Inapplicable)
Level 2	Light intake and natural ventilation are not possible at level 3.
Level 3	Nearly all dwellings (at least 80%) have exterior walls on at least two sides, ensuring effective light intake and natural ventilation.
Level 4	In addition to the above, building measures, such as ventilation voids, have been used to enhance their efficacy. They influence a majority (50% or more) of residential blocks.
Level 5	The building measures above cover at least 80% of residential blocks.

☐ Commentary

Evaluation of the direct use of natural energy in “Apartments” mainly covers efforts targeting dwellings. There are many examples of natural lighting and ventilation as basic energy-saving measures for homes, so level 3 is set for dwellings where the majority is exposed to natural light and ventilation on at least two sides.

Furthermore, in contrast to dwellings, “Apartments” designs are expected to choose block forms and orientations to make use of natural light and airflow, so efforts in these areas merit level 4 and level 5.

[7] High side light: windows provided by design for the effective use of natural light, installed at high place near ceiling

● 2.2 Converted Use of Renewable Energy

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	Of the efforts to be evaluated, none of the methods is used, or used only partially.
Level 4	Of the efforts to be evaluated, any of the methods is used in a majority of the building.
Level 5	Of the efforts to be evaluated, two or more of the methods are used in a majority of the building.

Efforts to be evaluated

NO.	Efforts to be evaluated
1	Use of sunlight: Planning for solar generation systems used in place of electrical power equipment. (E.g. Solar panels etc.)
2	Use of solar heat: Planning for effective use of solar heat systems in heating equipment to reduce heating loads. (E.g. Solar panels, vacuum-type water heaters)
3	Use of unused heat: Planning for effective use of unused-heat systems to improve heat source efficiency in heating equipment. (e.g. Heat pumps using well water or river water etc.)
4	Miscellaneous: Planning for the effective use of nature in other systems.

☐ Commentary

Solar cells, solar panels and other methods for converting natural energy into electricity or heat should be evaluated as converted use of natural energy.

Evaluate efforts to make use of converted natural energy, as appropriate for the scale and purpose of the building and its surrounding conditions. Make a qualitative assessment of design efforts at the Preliminary Design Stage to make effective use of natural energy, considering the scale of implementation in the building and the way methods are used.

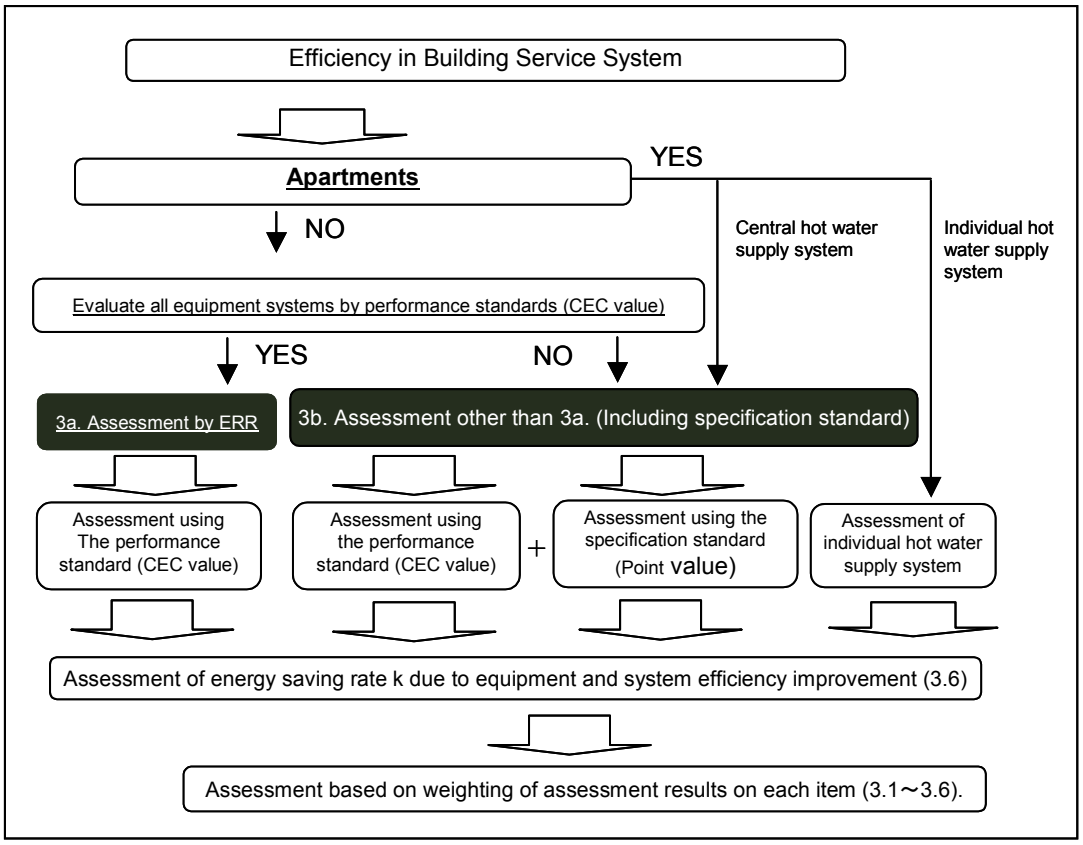
If measures have been used even partially, they should be evaluated as level 3. If they are applied to a majority of the building (50% or more of the total floor area) and can be expected to yield impact and real energy-saving effects, they should be evaluated as level 4 or 5.

For apartments in particular, assessment of converted use mainly considers measures taken for whole blocks, while direct use of natural energy mainly considers measures in each dwelling. (The form of the apartments means that it is practical to install centralized equipment on the common rooftops, and individual systems for each dwelling are rare.)

● 3. Efficiency in Building Service System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

With the exception of “Apartments,” equipment and system efficiency improvement in buildings should use performance standards (CEC value) or specification standards (Point value) for each equipment system regulated by the Energy Saving Law.
At the Preliminary Design Stage, the range of building type under the Energy Saving Law can be extended beyond the current regulations, enabling assessment of buildings of 5,000m^2 and more under the specification standards (Point value). Therefore, either the performance standard (PAL value) or the specification standard can be used for the assessment. The assessment method under the specification standard is not specified for some of the systems used. The performance standard should be applied in such cases. For “Apartments,” only hot water supply equipment is evaluated, and separate criteria are set.



3a. Assessment by ERR

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct - Assessment by ERR
Level 1	(ERR value) < -5%
Level 2	-5% ≦ (ERR value) < 0%
Level 3	0% ≦ (ERR value) < 10%
Level 4	10% ≦ (ERR value) < 25%
Level 5	25% ≦ (ERR value)

☐ Commentary

The energy considered by this assessment is, in principle, all the energy consumed in the building. Under the current Energy Saving Law (the Energy Conservation Law for buildings), the only five applications considered are air conditioning, ventilation, lighting, hot water supply and elevators. CASBEE, in contrast, considers all energy-consuming applications, in principle. However, no assessment criteria exist for applications other than air conditioning, ventilation, lighting, hot water supply and elevators. Therefore, other applications are not currently evaluated in practice. If the results of all equipment systems are evaluated by performance standards (CEC values), evaluate the ERR (Energy Reduction Ratio) value found by integrating all results from CEC.
ERR is a comprehensive indicator using the CEC calculation results under the Energy Saving Law. It expresses the rate of reduction in primary energy consumption for equipment systems and is calculated by the formula below.

$$ERR = \frac{\text{Total amount of energy saved in the evaluated building}}{\text{Standard primary energy consumption for the evaluated buildin}}$$

$$= \frac{(E^0_{TL} - E^C_{TL} + \triangle E^C_{EE})}{E^0_{TL}} = 1 - (1 - k) \times \frac{E^C_{TL}}{E^0_{TL}}$$

However, $E^C_{TL} = E^C_{AC} + E^C_V + E^C_L + E^C_{HW} + E^C_{EV} + E^C_{OT}$
$E^0_{TL} = E^0_{AC} + E^0_V + E^0_L + E^0_{HW} + E^0_{EV} + E^0_{OT}$
In this case,
ERR = primary energy consumption reduction rate
E^C_{TL} = Energy consumption in the whole building
E^C_{AC} = Energy consumption for air conditioning
E^C_V = Energy consumption for ventilation
E^C_L = Energy consumption for lighting
E^C_{HW} = Energy consumption for hot water supply
E^C_{EV} = Energy consumption for elevators
E^C_{OT} = Other energy consumption (everything other than air conditioning, ventilation, lighting, hot water supply and elevators) = 0.4 x (E^C_{AC} + E^C_L)
$\triangle E^C_{EE}$ = Actual amount of energy saved by the installation of equipment for improving energy efficiency.
k= Energy saving rate by equipment for improving energy efficiency = $\triangle E^C_{EE} / E^C_{TL}$
* For the k value, refer to LR1 ●3.6 Equipment for Improving Energy Efficiency

E^0_{TL} = The standard energy consumption for the whole building
E^0_{AC} = The Standard energy consumption for air conditioning = L^C_{AC} x CEC^0_{AC}
E^0_V = The Standard energy consumption for air ventilation = L^C_V x CEC^0_V
E^0_L = The Standard energy consumption for lighting = L^C_L x CEC^0_L
E^0_{HW} = The Standard energy consumption for hot water supply = L^C_{HW} x CEC^0_{HW}
E^0_{EV} = The Standard energy consumption for elevators = L^C_{EV} x CEC^0_{EV}
E^0_{OT} = The Standard other energy consumption (everything other than air conditioning, ventilation, lighting, hot water supply and elevators)
* Note: E^0_{OT} is assumed to equal E^C_{OT}, as no standard has been set for it.

CEC^0 = The CEC judgment criterion value specified in the Energy Saving Standard (notification) for the building.
L^C_{AC} = Hypothetical air conditioning load
L^C_V = Energy consumption for the standard ventilation equipment
L^C_L = Energy consumption for the standard lighting equipment
L^C_{HW} = Hypothetical hot water supply load
L^C_{EV} = Energy consumption for the standard elevator equipment

Symbol key
E= Primary energy consumption (MJ/m^2-yr.)
L= Annual load, or primary energy consumption from each of the standard equipment systems (MJ/m^2-yr)

(Superscripts)
0= Standard (reference) value
C= Calculated values for the evaluated building
(Subscripts) – Indicate energy applications
AC= Air conditioning application

V= Ventilation application
L= Lighting application
HW= Hot water supply application
EV= Elevator application
EE= Equipment for improving energy efficiency
OT= Other applications (electrical outlets, water supply and drainage, and other applications. Thus, it includes all applications other than air conditioning, ventilation, lighting, hot water supply and elevators.)
TL= Total of all applications (= AC + V + L + HW + EV + OT)

The CEC as the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating under CEC are presented below.

■Reference) CEC^0 judgment standard values under the Energy Conservation Law and notifications

		Hotels	Hospitals	Retailers	Offices	Schools	Restaurants	Halls	Factories
Performance standards	CEC/AC	2.5	2.5	1.7	1.5	1.5	2.2	2.2	—
	CEC/V	1.0	1.0	0.9	1.0	0.8	1.5	1.0	—
	CEC/L	1.0							
	CEC/HW	1.5 ~ 1.9 (a value set according to pipe length/ hot water volume)							
	CEC/EV	1.0	—	—	1.0	—	—	—	—
Specification standard		100 or less (the same for all equipment items)							

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3B. Assessment by means other than ERR

If the specification standard (Point value) is used for either equipment system assessment, the equipment types in 3.1~3.6 should be evaluated individually, with a weighting for each.
For “Apartments,” evaluate only hot water supply equipment.

● 3.1 HAVC System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Assessment using specification standard (Point value) is applicable only the scoring criteria for individual system using air source heat pump has been set for heat pump cooling, so the performance standard (CEC-AC) should be used for central heating/ cooling plant system.

	Assessment using the specification standard (Point value)
Level 1	Below the corrected points
Level 2	Above the corrected points and (Points) < 100pts
Level 3	100pts. ≦ (Points) < 130pts.
Level 4	130pts. ≦ (Points) < 160pts.
Level 5	160pts. ≦ (Points)
	Assessment using the performance standard (CEC-AC value)
Level 1	Compared to the standard value 5% < (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) ≦ 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Assessment of efficiency enhancement for air conditioning systems should mainly follow 1)~3) below.
1) Restriction on the number of units, use of variable water volume systems, local load countermeasures, waste heat recovery and large water temperature difference system etc. to enhance efficiency.
2) Consideration of the use of high-efficiency heat source equipment and heat storage systems, tailored to the load characteristics of the building.
Introduction of methods for reducing thermal loads (such as total enthalpy heat exchange and outside air cooling systems, minimum outside air volume control, and avoidance of re-heating by dehumidification).
3) Introduction of methods to reduce fan and pumping power (such as variable air volume system, large air temperature difference system, task air conditioning, occupancy zone air conditioning, and radiant heating and cooling).

* The specification standard for HVAC only evaluates gas heat pump heating and cooling in packaged air conditioners etc., so the performance standard should be used for other equipment.

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● 3.2 Ventilation System

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

	Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts ≦ (Points) < 100pts
Level 3	100pts ≦ (Points) < 120pts
Level 4	120pts ≦ (Points) < 140pts
Level 5	140pts ≦ (Points)
	Assessment using the performance standard (CEC-V value)
Level 1	Compared to the standard value 5% ＜ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) ≦ 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary
Assessment of efficiency enhancement for ventilation system should mainly follow 1)~2) below.
1) Introduction of method to reduce ventilation energy (localized extraction, high efficiency ventilation for kitchen, etc.)
2) The scoring criteria are based on the specification standard (Point value), with level 3 for 100 points scored on the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Buildings.

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● 3.3 Lighting System

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

	Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts. ≦ (Points) < 120pts.
Level 4	120pts. ≦ (Points) < 140pts.
Level 5	140pts ≦ (Points)

	Assessment using the performance standard (CEC-L value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

□ Commentary

Assessment of efficiency enhancement for lighting systems should mainly follow 1)~2) below.

1) Introduction of energy-saving methods for lighting equipment (such as high-efficiency light sources, electricity-saving ballast, high-efficiency light fixtures, and lighting methods able to accommodate flexible zoning).
2) Introduction of control methods to avoid waste (occupant sensor control, brightness sensor control, appropriate illuminance adjustment, daylight-linked control).

The scoring criteria are based on the specification standard (Point value), with level 3 for 100 points scored on the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Buildings.

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● 3.4 Hot Water Supply System Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct - Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts ≦ (Points) < 130pts.
Level 4	130pts. ≦ (Points) < 160pts.
Level 5	160pts. ≦ (Points)
	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Fct - Assessment using the performance standard (CEC-HW value)
Level 1	Compared to the standard value 5% < (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) ≦ 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

□ Commentary

Assessment of efficiency enhancement for hot water supply equipment should mainly follow 1)~2) below.

1) Improved insulation for water pipes and hot water tanks.
2) Introduction of appropriate control methods for hot water supply equipment and of high efficiency equipment.

The scoring criteria are based on the specification standard (Point value), with level 3 for 100 points scored on the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Buildings.

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	Apt - Individual supply system
Level 1	(Inapplicable)
Level 2	Other than those listed below

Level 3	Electric water heaters (electric control type)
Level 4	Fuel-burning instant-supply water heaters
Level 5	Fuel-burning latent heat recovery instant-supply water heaters, electric CO_2-refrigerant water heater (water storage heater using night-rate electricity)

☐ Commentary

For individual supply system, scoring criteria of +2~+5 are set for the various hot water supply systems used. The use of equipment of superior efficiency, and other measures that can be expected to yield energy-saving effects, should be highly evaluated.

If it is deemed possible to carry out the same kind of assessment for hotels and other buildings with central systems, the same assessment criteria of the specification standard (Point value) applied to buildings other than "Apartments" should be used.

The equipment primary energy consumption standards below are for individual systems.

■Reference) The relationship between individual systems and equipment primary energy consumption

Score	Standard	Compliant devices
2 pts.	Primary energy consumption 3.0KJ or more	Other than those listed below
3 pts.	Primary energy consumption 2.0KJ or more, less than 3.0KJ	Electric water heaters (electric control type)
4 pts.	Primary energy consumption 1.2KJ or more, less than 2.0KL	Fuel-burning instant-supply water heat
5 pts.	Primary energy consumption less than 1.2KJ	Fuel-burning latent heat recovery instant-supply water heaters, electric CO_2-refrigerant water heater (water storage heater using night-rate electricity)

* If the equipment used is not among the compliant devices listed in the table, it is sufficient to evaluate on the basis of primary energy consumption calculated from the rated performance of the equipment used.

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● 3.5 Elevators

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

	Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts. ≦ (Points) < 120pts.
Level 4	120pts. ≦ (Points) < 140pts.
Level 5	140pts. ≦ (Points)
	Assessment using the performance standard (CEC-EV value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Assessment of efficiency enhancement for elevator systems should mainly follow 1) below.

1) Control methods (such as AC feedback control[8], Ward-Leonard system[9], static Leonard control[10], VVVF and

[8] Thyristors and diodes are used in combination to detect and feed back the difference between command speed and actual speed, and the speed can be controlled by adjusting the firing angle, enabling smooth speed control and high floor arrival precision.

[9] This is one type of DC motor control, with a wide range of speed control and easy, smooth forward and reverse control. The controlled DC motor

appropriate transport capacity control)
The scoring criteria are based on the specification standard (Point value), with level 3 for 100 points scored on the Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Buildings.
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● 3.6 Equipment for Improving Energy Efficiency

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

☐ Commentary

Find the value of the energy saving rate k as below. The k value is a corrected value from the scores gained for items 3.1~3.5. The higher the energy saving rate, the further the score for that item is corrected upwards.
Equipment for improving energy efficiency is assumed to mean solar generation systems, cogeneration systems and the like. Installation of such equipment is expected to save energy by making effective use of energy in the building as a whole.
To evaluate the energy-saving effects, calculate the primary energy consumption that can be saved through equipment for improving energy efficiency, and divide the saving by the annual primary energy consumption for the whole building to find the energy saving rate k.
Finally, reflect the rate in the points scored for each building type.

$$\text{Energy saving rate } k = \frac{\text{Quantity of energy saved (MJ/yr.)}}{\text{Annual primary energy consumption (MJ/yr.)}}$$

If it is difficult to estimate annual primary energy consumption for the building as a whole when using the specification standard (Point value) for assessment, it is sufficient to calculate the energy saving rate k relative to a consumption value estimated from standard energy consumption rates for each building type. The designer should also find the quantity of energy saved by calculation.
This assessment should be reflected in score values for each items 3.1~3.5 as follows. (However, the upper limit is +5 points)

$$\text{Score after correction} = \frac{\text{Score value for scoring items in 3.1~3.5}}{(1.0-k)}$$

If the performance standard (CEC value) is used for the assessment, energy saving rate k is built into the ERR formula, so energy-saving efficiency is reflected in that assessment. (Refer to page 85.)
The assessment content for solar generation is also evaluated in LR-1 ●2.2 Converted Use of Renewable Energy, but the gist of the assessment differs, so the overlap can be permitted.

■Reference) Primary Energy Consumption Rates for Standard Buildings (per unit floor area)

	Hotels etc.	Hospitals etc.	Retailers etc.	Offices etc.	Schools etc.	Notes
Energy consumption per unit (MJ/㎡-yr)	3131	2798	2575	1870	1185	

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■Reference）Primary Energy Consumption Rates for Standard Apartments (per dwelling)

	Cold region	General region	Hot region	Notes
Energy consumption per unit (GJ/Household x yr.)	9.7	6.9	4.3	For heating, cooling and hot water supply

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and the motor generator which powers it are connected as shown in the diagram, and speed is controlled by regulating the excitation of the generator. The motor direction can be reversed by changing the orientation of the generator excitation current.
[10] This type uses a static power transformer in place of the motor generator. It is used to control the speed of high-speed elevators. It does not use any rotary machine such as a motor generator.

● 4. Efficient Operation

● 4.1 Monitoring

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The plan must make it possible to have a clear grasp of total energy consumption.
Level 4	The plan policy must allow for measurement equipment for each energy type used.＊1)
Level 5	Introduction of a management system such as BEMS[11] should be planned, with a structure able to measure the energy consumption for each system and device.＊2)

*1) Measurement of each type of energy.

Quantity of cooling and heating	Quantities of heating and cooling
Gas volume	Gas volume for heating and kitchen uses
Electrical power quantity	Electrical power for heat sources, air conditioning secondary equipment, ventilation, lighting, sockets and special loads (computer loads in office buildings, kitchen loads in restaurants, and other loads that account for high proportions of power consumption in applicable buildings).
Water supply volume	Water supply for heat sources and hygiene.

*2) Energy measurement for each system.

Quantity of cooling and heating	Quantities of cooling and heating for each air conditioning system
Gas volume	Gas volumes for each heat source and device, and for special uses that consume large volumes
Electrical power quantity	Power consumption for each air conditioning and ventilation device, and for each hygiene-related pump
Water supply volume	Water supply volume for each water supply demand (drinking and washing, toilet flushing, etc.)

☐ Commentary

Evaluate the active introduction of split metering systems for basic energy consumption, of the kind that allows consideration of building equipment operation management and leads to operational energy saving.
For assessment subjects that surpass the standard (level 3) at the Preliminary Design Stage and the Execution Design Stage, the main assessment content is as described in 1)~3).
1) Introduction of measurement systems for each building type (air conditioning heat source, fan and pumping power, lighting equipment, sockets etc., measured for each room and common area).
2) Introduction and use of a Building Energy Management System (BEMS[11]), and proposal of a management system for planned and organized operation, maintenance and preservation.
3) Setting target values for energy saving and annual energy consumption, with implementation of management plans to reach those targets.

[11]Control and monitoring system using a computer able to transfer data between the sensor measurement points and the operator terminal. This system includes building control and management functions, including control of aspects such as air conditioning, ventilation, fire safety, maintenance and energy management. It is used as a general term for building energy management systems in the IEA's international joint research.。

● 4.2 Operational Management System Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No significant moves (proposals) have been made towards an operation and management system.
Level 4	Basic guidelines for operation, maintenance and preservation have been planned.
Level 5	In addition to the above, target values have been planned for annual energy consumption

☐ Commentary

The operation and management system is not, in itself, design content, but rather a system that would be applied by the building owner. Therefore, this assessment should examine how far the designer went in preparing such a system, for cutting environment loads, and proposing it to the building owner.

The assessment should cover management systems and goal setting for planned and organized operation, maintenance and preservation of the building, the setting of target values for annual energy consumption, and the implementation of a target management plan to achieve the goals and targets. Level 5 is for "target management is applied to energy consumption," with marks allocated for the anticipated final targets.

LR-2 Resources & Materials

● 1. Water Resources

● 1.1 Water Saving Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	No systems for saving water.
Level 2	(Inapplicable)
Level 3	Major faucets are equipped with water-saving valve.
Level 4	In addition to water-saving valve, other water-saving equipment (such as flush-mimicking sound systems, water-saving toilets) is used.
Level 5	(Inapplicable)

☐ Commentary

Evaluate the water-saving methods installed on the building's water supply equipment.

*Water-saving equipment

Faucets	[1] Save water by regulating water flow volume.	Water-saving valve
		Fixed flow volume valves
		Foaming faucets etc.
	[2] Simplify operation of the equipment to save water by reducing wasteful flow.	Automatic faucets
		Fixed flow faucets (self-closing faucets)
Water-saving toilets	[1] Toilet bowls	Water-saving appliances (Improvements to water supply routes and bowl and trap shapes secure waste evacuation performance while saving water).
		Water-saving flush valves (Continuous flush prevention mechanism, with regulatable discharge volume)
	[2] Urinals	Flushing in response to usage, with user sensor.
		Fixed-time control system (combination with lighting, fan switch linkage and 24-hour timers).
Other		Privacy noise generators, etc.

● 1.2 Rainwater & Gray water

● 1.2.1 Rainwater Use System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No systems for using rainwater.
Level 4	Rainwater is used.
Level 5	Rainwater usage brings the rainwater usage rate to at least 20%.

☐ Commentary

Evaluate the level of rainwater use. The rainwater usage rate for level 5 is calculated by the formula below.

$$\text{Rainwater usage rate} = \frac{\text{Predicted rainwater usage volume}}{\text{Total predicted water usage (main water + rainwater use)}}$$

● 1.2.2 Gray Water Reuse System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No systems for reusing gray water.
Level 4	Gray water is reused.
Level 5	In addition to gray water reuse, there is equipment to reuse sewage.

☐ Commentary

Evaluate the level of gray water reuse. If equipment for sewage reuse is installed, in addition to gray water reuse, the building is level 5.

● 2. Materials of Low Environmental Load

● 2.1 Recycled Materials

● 2.1.1 Reuse Efficiency of Materials Used in Structure

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	Major structural elements are made of non-wood materials (RC/ SRC/ S), and none of the measures below are used.
Level 4	Major structural elements are made of non-wood materials (RC/ SRC/ S), and one or more of the measures below are used.
Level 5	Major structural elements are made of non-wood materials (RC/ SRC/ S), and two or more of the measures below are used.

☐ Commentary

Evaluate according to the total of the point scores for efforts to be evaluated listed below. Score one point for a measure that is used even in part, regardless of the amount of usage.

As shown in appendices 3 and 4, the usage of electric furnace steel in various construction applications stands at 60% of ordinary construction steel. Even for H sections, approximately 60% is electric furnace steel. Therefore if H sections in the design are of sectional dimensions sold by multiple electric furnace steel manufacturers, as shown in appendix 2, assume that electric furnace steel is used.

Point	Efforts to be evaluated
1	- Electric furnace steel used in major structural elements (Other than reinforcement bars)
1	- Portland blast furnace cement used in concrete portions of major structural elements
1	- Recycled aggregate used in concrete portions of major structural elements

● 2.1.2 Reuse Efficiency of Non-structural Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Inapplicable at the Preliminary Design Stage.

● 2.2 Timber from Sustainable Forestry Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	Timber from sustainably managed forests is not used.
Level 3	Timber from sustainably managed forests supplies less than 10% of timber usage. Or, timber is not used, even in the structure.
Level 4	Timber from sustainably managed forests supplies 10~50% of timber usage.
Level 5	Timber from sustainably managed forests supplies 50% or more of timber usage.

☐ Commentary

Timber is a material that should be renewable, and this item expresses the level of timber use in a building. However, when timber comes from tropical rainforests or illegally logged forests, it cannot be described as renewable. Therefore, the level of use of timber from sustainably managed forests is evaluated here.
Timber evaluated here as produced from sustainably managed forests is defined as follows:

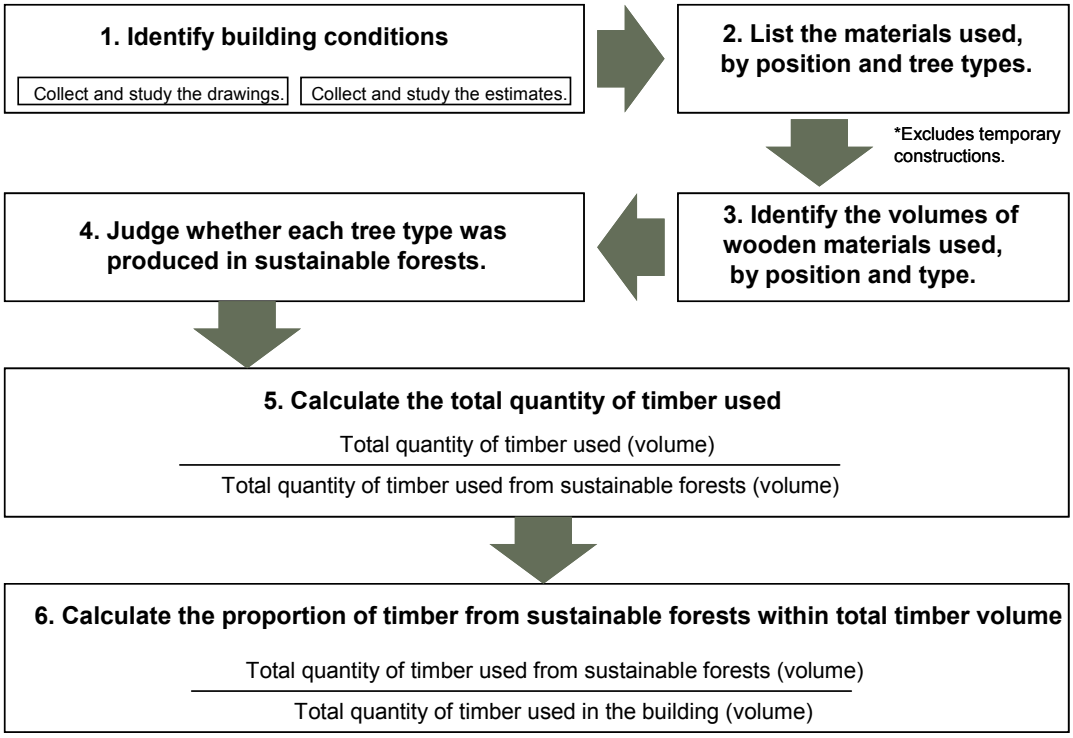
1. From thinned trees.
2. Timber from a verified source where sustainable logging is practiced.
3. From coniferous trees such as cedar grown in Japan.

Japan does not have the kind of system seen in other countries, that verifies that timber comes from forests where sustainable logging is practiced. Also, no timber clearly identified with stamps from such systems is distributed in Japan. Therefore, as a practical measure, coniferous woods such as cedar, which can be inferred to have been produced from thinning and, usually, from sustainable forests, can be treated as timber from sustainable forests. The coniferous wood listed in the Ministry of Construction's Notification 1452 (2000) on "determination of the standard strength of timber" can largely be regarded as being logged from sustainably managed forests.
Red pine, Norway spruce, Japanese Larch, Dahulian larch Larch, white cedar, hinoki (Japanese cypress), hemlock, spruce, todo fir, cedar
(All trees are produced in Japan.)

The usage ratio for timber produced from sustainable forests can be calculated by the procedure below.

1. Identify building conditions
2. List the timber materials used, by position and tree type.
3. Identify the volumes of wood materials user, by position and type.
4. Calculate the total volume of timber used.
5. Use the formula below to calculate the proportion of timber used that is produced from sustainable forests.

$$\frac{\text{Total quantity of timber used from sustainably managed forests (volume)}}{\text{Total quantity of timber used in the building (volume)}}$$



- 2.3 Materials with Low Health Risks

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There is no building material category (indicated in Reference 1) without substances specified in the Pollutant Release and Transfer Register Law. Or the inspection has not been carried out.
Level 4	There are 1~3 building material categories (indicated in Reference 1) without substances specified in the Pollutant Release and Transfer Register Law.
Level 5	There are 4 or more building material categories (indicated in Reference 1) without substances specified in the Pollutant Release and Transfer Register Law.

■Reference 1) Building materials to be evaluated

Categories	Building materials to be evaluated
Adhesives	For vinyl tile floors and seating
	For tiles
	For wallpaper
	For floor board
Sealants	For sash
	For Glass
	For tile joint
	For wall joint
Waterproofing agents	Primer for waterproofing
	For paint (surface coating)
Paints	For fittings (wooden and metal)
	For wooden parts（frames for floor and ceiling）
	For structural materials
	For walls
Anti-corrosion treatment	For skeleton
	For materials other than skeleton
Undercoats	For materials for coated floors
Floor coverings	For finishing wax
Preservatives	For wooden parts

☐ Commentary

Evaluate the level of use of low health risk materials used in the building by finding how many of the eight categories (adhesives, sealants, waterproofing work materials, paints, anti-corrosion treatments, undercoats, floor covering and preservatives) are free of substances specified in the Pollutant Release and Transfer Register Law (PRTR Law).

Buildings are made of numerous and diverse materials, each of which contain various chemical substances. These chemicals can impact health in forms such as sick house syndrome and endocrine disruption by environmental hormones. Under this item, materials which have a very low risk of causing health damage other than sick house syndrome, which is due to VOCs, are treated as "materials with low health risks."

The PRTR Law specifies the following conditions for "type 1 designated chemical substances" which should be managed under the law.

1) The chemical substance concerned threatens to harm human health, or to impair the lives or growth of flora and fauna.
2) Condition 1) is applicable to chemical substances which can easily be generated from the substance concerned through the action of nature.
3) The chemical substance concerned depletes the ozone layer, harming human health through the increased penetration of ultraviolet radiation to the surface.

In addition to any one of the above,

4) The physical or chemical state of the chemical substance, and the conditions of its manufacture, import, use and generation are recognized to result in its continuing presence in the environment over a wide area.

■Reference 2) Examples of "type one designated chemical substances" and "type two designated chemical substances."

Volatile organic compounds	Benzene, toluene, xylene etc.
Organochlorines	Dioxins, trichloroethylene etc.
Agrochemicals	Methyl bromide, fenitrothion, chlorpyrifos etc.
Metallic compounds	Lead and its compounds, organic tin compounds
Ozone-depleting substances	CFCs, HCFCs etc.
Other	Asbestos etc.

In evaluating the level of usage of materials of low health risk, it is logical to indicate the total volumes of each substance type covered by the PRTR Law that are used in the evaluated building. However, that is not practically possible, for the following reasons.

1) As of June 2003, (Japanese) government ordinances have designated 354 types under "Type one designated chemical substances" alone.
2) The Material Safety Data Sheets (MSDS) have not been written for the chemical substances used in buildings that must be managed.
3) It would be a huge task to calculate the volumes of materials used in the building.
   Instead, it is more practical to consider applications where there is a certain probability of these substances appearing, and count the number of such categories of building materials that are free of substances designated under the PRTR Law.
   The categories of materials which have at least a certain probability of containing materials with health risks are adhesives, sealants, waterproofing work materials, paints, anti-corrosion treatments, undercoats, floor covering and preservatives. For this assessment of the use of materials of low health risk, the number of those categories (reference 1) which are free of chemical substances designated under the PRTR Law should be counted, with reference to the following table of "Building Materials Which do not Contain Chemical Substances Covered by the PRTR Law."

● 2.4 Reuse of Existing Building Skeleton etc.

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The existing building skeleton is not reused, or there is no existing building on the site to use.
Level 4	The existing building skeleton is partially reused.
Level 5	The existing building skeleton is completely reused.

☐ Commentary

The structure (skeleton) of a building, other than timber-framed buildings, generally accounts for approximately 90% of its weight and 70% of its total embodied energy. Therefore, when construction is to be carried out on a site with an existing building, the resource productivity of the new building will differ greatly depending on whether the skeleton of the existing building is reused or entirely removed in favor of a completely new building. This item evaluates the level of reuse of existing building structural elements, such as reuse of existing piles and preservation of existing building perimeter walls, from the point of view of resource productivity.

The term "building skeleton" as used here includes the existing piles and perimeter wall. This item is intended to cover rebuilding or large-scale refurbishment works, with levels assigned according to the extent to which the skeleton of the previous building on the site is reused. If a new building is built on a green field site, level 3 should be assigned for this item.

It is natural that existing buildings cannot be reused unconditionally, considering their earthquake resistance and state of deterioration, but if the existing building skeleton is not used for such reasons, the new building should be able to achieve a high level on the Q (Quality) item. Therefore, this item will only consider whether or not the existing building skeleton is used.

● 2.5 Reusability of Components & Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	None of the evaluated measures to encourage recycling of materials on demolition has been used.
Level 4	One or more of the evaluated measures to encourage recycling of materials on demolition has been used.
Level 5	Two or more of the evaluated measures to encourage recycling of materials on demolition have been used.

Point	Efforts to be evaluated
1	The structure and finishing materials can be separated easily.
1	Interior finishes and equipment are not entangled, and each can easily be removed separately for demolition, refurbishment and remodeling.
1	Reusable unit materials are used.

☐ Commentary

Evaluate the efforts and measures to encourage recycling of materials when the building is demolished and disposed at the end of the building's life cycle, such as easy separation of materials. The reusable unit materials include OA floors and movable partition.

● 2.6 Use of CFCs & Halons

Evaluate fire retardants, insulation materials and refrigerants for efforts to reduce the use of CFC and Halons.

● 2.6.1 Fire Retardant

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Atmospheric emission of CFCs and halons causes ozone depletion on a global scale. In the construction field, CFCs and halons have been used in large quantities for flame retardant agents, insulation materials and refrigerants. Legal restrictions now apply in Japan, so that only CFCs and halons with very low potential for ozone depletion are used, but those gases must still be handled with care, as they have a large impact on global warming.

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Halon fire retardant is used.
Level 2	(Inapplicable)
Level 3	Only used in "Critical-use.
Level 4	No halon fire retardant is used.
Level 5	(Inapplicable)

☐ Commentary

Halon fire retardants have been banned in principle since 1994. However, there are some situations (Critical-uses) where they must be used for public safety, due to restrictions in some facilities. Therefore, the use of halon fire retardants has been permitted for the facilities marked "*" in the table below, which have been designated as critical uses (for both designated fire retardant materials and non-designated fire retardant materials) in notice by Fire and Disaster Management Agency (Prevention Notification No.155, Hazard Notification No.61, 16th May 2001). If halon fire retardant is used for Critical-uses, for the above reasons, the building should be evaluated at level 3, and at level 4 if absolutely none is used.

■Reference) Critical-uses for which halon fire retardants may be used

Types of facility			Examples of facility
Communications equipment etc.	*Communications equipment rooms etc.		Communications equipment rooms, wireless equipment rooms, telephone exchange rooms, magnetic disk rooms, computer rooms, telex rooms, telephone exchange switching rooms, communications equipment control rooms, dataprint rooms.
	*Broadcasting studios etc.		TV relay rooms, remote centers, studios, lighting control rooms, musical equipment rooms, adjustment rooms, monitor rooms, broadcasting equipment rooms.
	*Control rooms etc.		Electrical power control rooms, operation rooms, control rooms, management rooms, disaster prevention centers, dynamometer rooms.
	Generator rooms etc.		Generator rooms, transformer rooms, refrigerated rooms, freezer rooms, battery rooms, switchboard rooms, power supply rooms.
	Cable rooms		Public utility conduit, indoor access holes, underground pits, EPS.
	*Film storerooms		Film storage rooms, lighting control rooms, relay desks, VTR rooms, tape rooms, projector rooms, tape storerooms.
	*Measurement equipment rooms in hazardous material handling facilities		Measurement equipment rooms in hazardous material handling facilities
*Historical assets		Exhibition rooms etc.	Important cultural assets, artwork repositories, exhibition rooms, showrooms.
*Other		Workshops etc.	Print rooms containing rotary presses.
Hazardous materials	Repositories		Hazardous material manufacturing areas, indoor storerooms, fuel rooms, oil stores.
	Areas where paints etc. are handled		Vacuum rooms, paint storage rooms, cutting oil recovery rooms, painting rooms.
	Areas where hazardous materials are used and handled		Boiler rooms, incinerators, fuel pumping rooms, fuel dispensaries, heating equipment rooms, steam turbines, gas turbine rooms, foundries, drying rooms.
	Areas where hydraulic equipment is used		Hydraulic control rooms.
	Tank structures		Tank structures, indoor tank storage areas, indoor tank rooms, underground tank pits, centralized oil supply facilities, factory tanks, ink tanks, oil tanks.
	Floating roof tanks		Floating roof seals of floating roof tanks.
	LP gas odorization facilities		City gas and LP gas odorization rooms
Parking garages	Repair workshops etc.		Automobile repair workshops, automobile laboratories, storage garages.
	Parking garages etc.		Self-propelled parking garages, mechanized parking garages, ramps, car lanes.
Other	Mechanical rooms etc.		Elevator machine rooms, air conditioning machine rooms, water intake tank pump rooms
	Kitchens etc.		Kitchens
	Workshops etc.		Optics assembly rooms, lacquer workshops, gold workshops, shipping rooms, packaging rooms, print rooms, tracing rooms, machine tool rooms, manufacturing equipment, welding lines, etching rooms, cutting rooms.
	Research laboratories etc.		Testing rooms, engineers' rooms, research laboratories, development laboratories, analysis rooms, experiment rooms, sterile rooms, shielded rooms, pathology laboratory, washing rooms, radiology rooms.
	Warehouses etc.		Warehouses, packaging warehouses, storerooms, chilled storerooms, trunk rooms, paper stores, waste material stores.

	Book repositories etc.	Book repositories, document rooms, document repositories, libraries, medical record stores.
	Precious objects etc.	Sales showrooms for jewel, furs and precious metals.
	Other	Offices, reception rooms, meeting rooms, canteens, dining rooms.

Of the locations marked "*," installation is only permitted in areas frequently visited or permanently occupied by people, and where no other fire-prevention equipment is suitable.

- 2.6.2 Insulation Materials Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Insulation foaming materials with OPD= 0.2 or above are used.
Level 2	Insulation foaming materials with OPD= 0.01 or more, less than 0.2 are used.
Level 3	Insulation foaming materials with OPD= 0.0 or more, less than 0.01 are used.
Level 4	(Inapplicable)
Level 5	Insulation foaming materials with ODP=0 and low GWP (less than 50, by 100-yr GWP), or natural materials are used. Or no insulation foaming material is used.

☐ Commentary

ODP (Ozone Depletion Potential) is an ozone depletion coefficient, comparing the quantity of ozone destroyed by a chemical substance as a multiple of the ozone destroyed by 1kg of CFC-11, which is set as 1. Of course, a substance with absolutely no potential for ozone depletion has an ODP of zero.

GWP (Global Warming Potential) compares the global warming effect per unit quantity of a chemical substance as a multiple of the unit global warming effect of CO_2, which is set as 1.

Insulation materials can be classified into mineral fiber materials, such as glass wool, rock wool and asbestos, expanded plastic materials, such as polyurethane, polystyrene and polyethylene, and natural materials such as carbonized cork, cellulose fiber and wool. Of these, chlorofluorocarbons (CFCs) and halons (HCFCs) are used in the expanded plastic insulation materials listed below.

Reference 1) Foaming agents used in expanded plastic insulating materials

Application	~1995	Start of 2000	Next generation
Urethane foam Urethane modified isocyanurate foam	CFC-11	HCFC-141b	HFC-134a HFC-245fa Cyclopentane
Styrene Olefin foam	CFC-12	HCFC-142b	HFC-134a
Phenol foam	CFC-113	Dichloromethane	

In Japan, only expanded insulation materials of extremely low ODP are on sale, so it is very normal to use expanded insulation materials with ODP= 0~0.01, and those should be assigned level 3. However, the GWP (Global Warming Potential) values for foaming gases used at present are not low, so if the insulation used has ODP=0 and a very low GWP level, it should be rated level 5. The table below shows the ODP and GWP values of various foaming gases. Except for some special cases, use values in 100 years category for GWP value at level 5.

Reference 2) ODP and GWP values of foaming gases

Substance	Persistence in atmosphere	ODP (CFC standard)	GWP (CO_2 standard)		
			20 yrs.	100 yrs.	500 yrs.
CFC－11	50	1.0	5000	4000	1400
CFC－12	120	1.0	7900	8500	4200
CFC－113	85	0.8	5000	5000	2300
CFC－114	300	1.0	6900	9300	8300
CFC－115	1700	0.6	6200	9300	13000
HCFC－22	13.3	0.055	4300	1700	520
HCFC－123	1.4	0.02	300	93	29
HCFC－124	5.9	0.022	1500	480	150
HCFC－141b	9.4	0.11	1800	630	200
HCFC－142b	19.5	0.065	4200	2000	630
HCFC－225ca	2.5	0.25	550	170	52
HCFC－225cb	2.6	0.033	1700	530	170
HFC－23	264	0	9100	11700	9800
HFC－32	5.6		2100	650	200
HFC－125	32.6		4600	2800	920
HFC－134a	14.6		3400	1300	420
HFC－143a	48.3		5000	3800	1400
HFC－152a	1.5		460	140	42
HFC－227ea	36.5		4300	2900	950
HFC－236fa	209		5100	6300	4700
HFC－245ca	6.6		1800	560	170
FC－14	50000	0	4400	6500	10000
FC－116	10000		6200	9200	14000
FC－218	2600		4800	7000	10000
FC－C318	3200		6000	8700	12000

● 2.6.3 Refrigerants

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	HCFC is used as the refrigerant
Level 3	Refrigerant of ODP=0 is used as the refrigerant.
Level 4	Natural refrigerants and new chilling systems (ODP=0) are used.
Level 5	(Inapplicable)

☐ Commentary

The use of CFC substitutes as refrigerant is now widespread, so refrigerants of ODP=0 are set as level 3. Level 4 is for natural refrigerants and new chilling systems, which are as listed below.

1) Natural refrigerants are CO_2 and hydrocarbons such as ammonia, propane and butane.
2) New chilling systems (MH chilling systems) are those using hydrogen-occluded alloy (MH alloy).

MH alloy is able to store up to 1,000 times its own volume of hydrogen. When it absorbs hydrogen, it emits heat, and absorbs heat when it emits hydrogen, and these properties are used for refrigeration.
Inapplicable when no refrigerant is used.

LR-3 Off-site Environment

For assessment of LR-3, the assessor assigns credits according to the level of each listed effort shown in the Efforts to be evaluated for scoring items. The total number of credits is converted to a credit ratio for scoring and evaluated on a five-level scale. The specific method is described below.
As most of the assessment items under LR-3 are qualitative, therefore the content of the efforts made and comments need to be described separately in the “Brief Summary of Design for Environment” column prepared in the scoring software.
[Scoring method]
1) Evaluate the content of items in the efforts to be evaluated, according to the actual planned level (the target level if the assessment is at the planning stage), on a three-level scale (High, Low, None). For some items there are only two levels.

* Some points can be selected as “Exclude,” according to factors such as the building types and site conditions. The cases which are to be excluded are stated in the commentary for each point. Select "Exclude" on the scoring software, and the item concerned will be automatically excluded from the scoring subjects.

2) Record the total for all evaluated items in the (1) Total Credits space.
3) Enter the maximum total score for all evaluated items (omitting those items which have been excluded) in the (2) Maximum Score space.
4) Calculate ratio of (1) Total Credits to (2) Maximum Credits as (1)/(2) and record the result in the (3) Credit Ratio space.
5) Refer to the levels 1~5 shown in the scoring criteria, select the level corresponding to the (3) Credit Ratio and use that level as the assessment.

When the assessor has entered the credits for each item in the scoring software, (1) Total Credits, (2) Maximum Credits and (3) Credit Ratio will be calculated automatically.

● 1. Air Pollution

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0.0≦Credit Ratio (3) < 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3) < 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3) < 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3) < 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I.** Efforts within the building or the residential section 1) Selection of low-NOx and low-SOx equipment types (individual system)
2	1	0	2）Selection of low-NOx and low-SOx equipment types.(central system)
2	1	0	3）Use of clean fuels, such as natural gas and low-sulfer fuel.
2	1	0	4）Existence of an operation monitoring plan
2	1	-	5）Other
1	1	0	**II.** Efforts within the exterior 6）Use of plants to absorb NOx, SOx and dust.
1	1	0	7）Use of atmospheric purification systems, such as photocatalysis and soil cleaning.
1	1	-	8) Other
(1) Total Credits			(2) Maximum Credits / (3) Credit Ratio [(1)/(2)] =

For 1), select “Exclude” when only centralized systems are used. And for 2), select “Exclude” when only systems for each dwelling are used.

☐ Commentary

The three evaluated targets under atmospheric pollutants are NOx, Sox and dust, which are the major pollutant products from burning fuels such as crude oil and gas.

Assessment according to the above table of efforts is appropriate where there are combustion systems on site. If absolutely no atmospheric pollutants are generated on site, level 5 should be awarded without reference to the table (because CASBEE only evaluates loads from within the hypothetical closed space to space outside). Fully electrified residents, and buildings belonging to building multi-systems or district heating and cooling systems, which do not use combustion equipment, should be graded level 5.

1), 2) Low-NOx and SOx equipment and measures

Evaluate equipment which operates for individual units under 1), and centralized equipment under 2). If there is no equipment corresponding to either, both 1) and 2) can be excluded. Applicable equipment is low-NOx or low-SOx equipment. Those found to be applicable on reference to equipment lists prepared by local authorities or industry bodies should be evaluated. Evaluate the level as “High” if nearly all equipment is applicable and “Low” if only some equipment is applicable.

Examples of the main measures using low-NOx and low-SOx equipment are listed below.

a) Countermeasures for boilers (including small water heaters for homes)
   - Low-Nox burners, dust collection equipment, exhaust gas desulfurization system and smoke monitoring systems

b) Countermeasures for gas turbins
   - Water or steam jets, combustion improvement (pre-mixed, lean-burn systems and two stage combustion), after-treatment (ammonia denitrification, steam jets)

c) Countermeasures for gas engines
   - Ignition timing lag, Exhaust Gas Recirculation (EGR), Lean burn (main combustion chamber, auxiliary combustion chamber), exhaust after treatment (catalytic reduction method and catalytic cracking method) and three-way catalysis method

3) Use of clean fuels

For liquid fuels, low-sulfur fuels and natural gas, which reduce SOx emissions, should be evaluated. Natural gas is now widely used as city gas, and in that case it can be regarded as a clean fuel. Award “High” if it is used in all combustion equipment, and “Low” if it is used in some such equipment.

4) Existence of a plan for monitoring during operation

Even if low-NOx and –SOx equipment has been installed, it will not keep its performance without appropriate maintenance. Under this item, evaluate whether there is a plan for maintenance of the equipment while the building is operating.

5) Other

As miscellaneous examples, evaluate the use of cleaning equipment, such as smoke desulfurization equipment and dust collectors, and other active efforts to reduce the emission of atmospheric pollutants.

6) Purification of atmospheric pollutants using plants

Evaluate the efforts for the purification of atmospheric pollutants using absorbing effect of plants. The efficacy of atmospheric purification using plants varies greatly with the growth of the trees and plants and their resistance to atmospheric pollutants. They should be considered carefully, with reference to books on their use. Evaluate whether efforts have been made on two levels, “Present” or “None,” regardless of the scale of those efforts.

7) Use of photocatalysis, soil cleaning and other atmospheric cleaning equipment

The development of products with atmospheric cleaning functions, such as photocatalytic cleaners, has made great progress in recent years. Under this item, evaluate artificial methods to clean the atmosphere. Evaluate whether efforts have been made on two levels, “Present” or “None,” regardless of the scale of those efforts.

■Reference 1) List of plans for atmospheric purification

	Areas with relatively low concentrations (Residential areas etc.)	Regions with high concentrations (Near construction works, trunk roads, etc.)
Tall trees	(Evergreen trees) Myrica rubra, Quercus phillyraeoides, Quercus myrsinaefolia, Quercus glauca, Castanopsis cuspdata, Pasania edulis, Magnolia grandiflora, Cinnamomum camphora, Machilus thunbergii, Ilex rotunda, Ternstroemia gymnanthera, Dendropanax trifidus, Juniperus chinensis, Ilex integra, Viburnum awabuki (Deciduous trees) Zelkova serrata, Celtis sinensis, Aphananthe aspera, Ulmus davidiana, Paulownia, tomentosa, Ginkgo biloba, Quercus acutissima, Ulmus parvifolia, Liriodendron tulipifera, Ailanthus altissima, Firmiana simplex, Lagerstroemia indica, Castanea crenata, Acer palmatum, Magnolia kobus, Magnolia denudata, Prunus jamasakura, Prunus yedoensis, Acer palmatum, Carpinus tschonoskii, Carpinus laxiflora, Aesculus turbinata, Sophora japonica, Acer buergerianum, Quercus serrata, Platanus orientalis, Platanus acerifolia, Melia Azedarach, Diospyros kaki, Prunus pendula, Sapium sebiferum, Styrax japonica, Robinia pseudoacacia, Cornus controversa, Prunus lannesiana, Prunus lannesiana, Alnus japonica, Liquidambar styraciflua, Quercus dentata, Clethra barbinervis, Prunus persica Or other trees equivalent to the above.	(Evergreen trees) yrica rubra, Quercus phillyraeoides, Quercus myrsinaefolia, Quercus glauca, Castanopsis cuspdata, Pasania edulis, Magnolia grandiflora, Cinnamomum camphora, Machilus thunbergii, Ilex rotunda, Ternstroemia japonica, Dendropanax trifidus, Juniperus chinensis, Ilex integra, Viburnum awabuki (Deciduous trees) Ginkgo biloba, Quercus acutissima, Ulmus parvifolia, Liriodendron tulipifera, Ailanthus altissima, Firmiana simplex, Acer buergerianum, Quercus serrata, Platanus orientalis, Platanus acerifolia, Liquidambar styraciflua, Melia azedarach, Sapium sebiferum, Robinia pseudo-acacia, Prunus lannesiana, Prunus lannesiana, Alnus japonica, Liquidambar styraciflua, Quercus dentata Or other trees equivalent to the above.
Medium-height trees	(Evergreen trees) Ilex crenata, Euonymus japonicus, Ligustrum japonicum, Nerium indicum (Deciduous trees) Prunus mume, Sambucus sieboldiana, Cercis chinensis, Euonymus sieboldianus, Magnolia stellata, Magnolia liliflora Desr Or other trees equivalent to the above.	(Evergreen trees)） Ilex crenata, Euonymus japonicus, Ligustrum japonica, Nerium indicum (Deciduous trees) Sambucus racemosa, Euonymus Sieboldianus Or other trees equivalent to the above.
Low trees	(Evergreen trees) Rhododendron pulchrum, Rhododendron kaempferi, Rhaphiolepis umbellata, Rhaphiolepis umbellata, Fatsia japonica, Rhododendron indicum, Rhododendron mucronatum, Abelia grandiflora, Camellia sinensis (Deciduous trees) Hibiscus syriacus, Forsythia suspensa, Corylopsis spicata, Corylopsis pauciflora, Lespedeza bicolor var. japonica, Euonymus alatus, Weigela coraeensis, Viburnum plicatum, Ilex serrata Or other trees equivalent to the above.	(Evergreen trees) Rhododendron pulchrum, Rhaphiolepis umbellata, Rhaphiolepis umbellata, Fatsia japonica, Rhododendron indicum, Rhododendron obtusum, Abelia grandiflora, Camellia sinensis (Deciduous trees) Hibiscus syriacus, Forsythia suspensa, Weigela coraeensis, Viburnum plicatum Or other trees equivalent to the above.

Note 1)

Trees for landscaping are divided by height into tall, medium-height and low trees to make it easier to use

them in landscaping.

Tall trees: 3m and above
Medium-height trees: 1m to 3m
Low trees: Up to 1m

Trees may be categorized as medium-height or low, even if their physiological characteristics mean they can surpass those heights, if they are of varieties that commonly have their height and branch length pruned or trained for use as hedges or similar forms.

Note 2)
There are tree varieties which have low gas absorption rates, but have strong resistance to atmospheric pollutants and generally tolerate shade. Such trees are commonly used in urban greening. The varieties above may be interspersed with these varieties.

Tall trees (evergreen): Ligustrum lucidum, Cleyera japonica, Daphniphyllum macropodum, Daphniphyllum tejismanni, Neolistsea sericea
Medium-height trees (evergreen): Photinia glabra, Camellia Sasanqua, Eurya japonica, Osmanthusfortunei, Osmanthus ilicifolius
Low trees (evergreen): Eurya emarginata, Mahonia japonica, Aucuba japonica, Pieris japonica, Oittosporum tobira, Daphne odora, Gardenia jasminoides

■Bibliography 33),34)

● 2. Noise, Vibration & Odor

● 2.1 Noise & Vibration

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Fct	Hsp・Htl・Apt
Level 1	On the Efforts to Be Evaluated, 0.0≦Credit Ratio (3)<0.2	On the Efforts to Be Evaluated, 0.0 ≦Credit Ratio (3)< 0.1
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4	On the Efforts to Be Evaluated, 0.1 ≦Credit Ratio (3)< 0.2
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	I. Dwellings section 1) Noise generated by the exterior machinery of air conditioning systems for individual dwellings should be evaluated according to the type of equipment, the installation location, installation spacing and the presence of noise countermeasures. (Applied to “Apartments” only.)	
2	1	-	2）Other (Applied to “Apartments” only.)	
2	1	0	II. Entire building and Common Properties 3) Use of low-noise and low-vibration equipment	
2	1	0	4) Consideration of the installation positions of equipment that generates vibration and noise, and countermeasures against those sources (sound absorbers, sound-absorbent lagging*[12], vibration-damping structure etc.).	
2	1	0	5) Consideration for extractor fan noise and other background noise generated in the building (positioning of extractor, ventilation and other openings, measures taken on fans, etc.).	
2	1	0	6) Presence of measures to reduce wind roar from building exterior finishes	
2	1	0	7) Measures to prevent the propagation of noise to adjacent land (anti-noise measures such as sound-baffling walls and trees etc.)	
2	1	0	8）Presence of measures to reduce noise from on-site car parking to adjacent plots	
2	1	-	9）Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Evaluate measures used to reduce the impact that noise generated within the building has on surrounding areas beyond the site boundary.

1) Noise generated by the exterior machinery of air conditioning systems for individual dwellings should be evaluated according to the type of equipment, the installation location, installation spacing and the presence of noise countermeasures. (Applied to “Apartments” only.) Evaluate whether or not any measures are used to reduce the noise for devices installed in individual dwellings, such as home air conditioning units. Award “High” if such measures have been taken on all dwellings where they are required, and “Low” if only some such dwellings are covered.

3) Use of low-noise and low-vibration equipment

Award “High” if low-vibration and low-noise equipment has been chosen for all, or nearly all, equipment that might generate noise and vibration, and “Low” for partial usage. If there is no relevant equipment, exclude this item.

4) Consideration for the positioning noise and vibration-generating equipment, and source countermeasures

Large-scale equipment requires measures to mitigate the transmission of noise and vibration to surrounding areas. Evaluate measures for mitigating transmission within the building, including the equipment location plan and installation methods. There are various possible methods, the methods that will be evaluated can be set at will. If the measures used for mitigating transmission appear highly effective, award “High,” and award “Low” if the measures are effective to some extent. If there is no relevant equipment, exclude this item.

Examples of major measures applied to vibration and noise sources are presented below.

a) Vibration source countermeasures: Possible countermeasures against vibration sources include elimination of the source, reduction of agitative force, correction of imbalances, material rigidity and weight calculation for supports. The best method should be selected after thorough analysis of the

[12] Sound-absorbent lagging: Noise prevention method that wrapping ducts and pipes etc. with material such as glass fiber or rockwool to block mechanical noise.

problem.

b) Elastic support measures: Technical methods to reduce vibration generation, such as increasing foundation weight and increasing supporting forces under the foundation, can reduce vibration amplitude, but the most common approach is to make it more difficult for the mechanical agitative force to propagate to the foundation (using, for example, resilient supports of materials such as anti-vibration rubber, metal springs, pneumatic springs or wire mesh sponges).

c) Measures against propagation of vibration through the earth: If waves are propagating through a medium, the vibration generally diminishes with increasing distance. This is called distance attenuation. It is related to the sitting and arrangement of factories and facilities, involving measures such as relocating vibration sources or extending the site.
Another method is to interpose an obstruction to limit transmission, such as a trench or buried wall in the propagation route, but considerable studies are required when planning to use such methods.

5) Consideration for extractor fan noise and other background noise generated in the building
The operation of fixed fans generates localized noise, and noise can be transmitted within a building through ducts and other channels, causing localized noise in surrounding areas. Under this item, evaluate measures such as locating extractor fan outlets, ventilation openings and other openings in places where noise they transmit to the outside will have no impact, changing fan types, and installing baffles on the outside of vents. Evaluate measures in levels of “High,” “Low” and “None.”

6) Presence of measures to reduce wind roar from building exterior finishes
External details such as hand rails, louvers and window frames can generate problematic levels of wind roar. Possible countermeasures include changing the form and positioning of elements that could generate wind noise. Award “High” if such measures have been taken on all locations where they are required, and “Low” if only some such locations are covered. Exclude this item from assessment for relatively low-rise buildings and other buildings where no noise prevention measures are required.

7) Measures to prevent the propagation of noise to adjacent land (anti-noise measures such as sound-baffling walls and trees etc.).
Evaluate measures to mitigate the transmission of noise generate in the exterior of the building. The use of shielding elements such as trees and fences is a potential method. Evaluate measures in levels of “High,” “Low” and “None.” Exclude this item from assessment if the measures listed above have reduced noise sufficiently, or if there was no noise in the first place.

8) Presence of measures to reduce noise from on-site car parking to adjacent plots
Evaluate whether any measures are used to reduce the transmission of noise from on-site parking areas for cars and motorcycles to adjacent sites. Possible measures include placing parking lots in positions where they will have no impact, and building sound-baffling walls. Exclude this item from assessment if there is no parking on site, or if the number of parked vehicles is small, so there is little cause for concern over vehicle noise.

Reference 1) Examples of noise prevention measures

Content							Acoustical insulation effect
Physical methods	Technical measures against sound sources	The source of the sound must be removed	Prevention of variation Direct pressure	Prevention of vortices, flow disturbances, explosions etc.			Estimate on the basis of experience and experiments etc.
			Reduction of object vibration	Reduction of agitative force		Eliminate impact, collision, friction and imbalance. Put in balance.	〃
				Vibration isolation		Place anti-vibration devices between the vibrating body and the stationary body to put the vibration transfer rate below 1.	〃
				Damping processes		Paint or stick anti-vibration material onto the surface to raise the loss coefficient to 5% or more. Use anti-vibration steel plates.	Normally around 10dB. Estimate on the basis of experience
	Transmission reduction technologies	Reduction of the transmission of sound that has been generated	Reduction of sound transmission	Sound absorption processes		Apply sound absorbent material to locations struck by sound to give the necessary absorption rate.	Determined by design.
				Sound isolation	Sealed type	Surround the sound source with materials having the necessary transmission losses (covers, hoods, structures).	〃
					Partial type	Erect barriers (walls, building) with sound reduction index of at least 10dB from the source volume.	〃 25dB is the limit.
					Opening type	Attach mufflers along the sound route with the necessary sound reduction index.	Determined by design
			Use of phenomena which reduce sound transmission	Distance attenuation		Move the sound source as far as possible away from the problem point.	0~6dB double distance
				Attenuation by directionality		Do not orient directions of strong sound radiation towards the problem point.	Normally around 10dB
				Attenuation by absorption in air		Effective with long distances and high-frequency sources.	0.6dB/100m（1kHz ） Around 5dB/100m (8kHz)
				Attenuation by air temperature and wind		Place the sound source downwind.	Differs with wind speed and air temperature distribution.
				Attenuation by absorption in ground surfaces		Make the ground surface sound absorbent.	Around 0.7dB/10m for grass 30cm high（1kHz ）
				Attenuation by trees		A row of trees has no effect in blocking noise.	Around 10dB/50m for trees with high leaf density
Sensory methods	Masking			Generate a noise to mask the offending noise. Effective against low noise levels.			
Psychological methods	Greetings, compensation etc.			Consider psychology in dealing with the situations of the offended and offending parties.			

■Bibliography 35）

● 2.2 Odors

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	1) Measures targeting sources of odor. (Not applied to “Apartments.”)	
2	1	0	2）Installation of equipment to eliminate or reduce offensive odors. (Not applied to “Apartments.”)	
2	1	0	3）Measures against waste (organic gabege etc.) generated by building operation	
2	1	-	4）Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Under this item, evaluate measures to reduce odors generated by the operation of the building. The Offensive Odor Control Law regulates odors connected with the activities of factories and business premises within regulated zones, setting concentration values for Offensive Odor Substances and odor index. Odors generally emitted from buildings are those vented from operating machinery, from sewage septic tanks, and from organic waste. The Ministry of the Environment set its “Odor Environmental Guideline” in 2000, and the Ministry is taking steps to raise people’s awareness of odor issues.

Assessment of measures at the design stage should exclude consideration of activities beyond the scope anticipated for the operation of the building (such as businesses conducted by tenants).

1) Measures targeting sources of odor

In addition to factories and other facilities which handle chemicals, other buildings which handle materials likely to generate odors should have measures targeting the sources of odor, which is an effective approach. Measures at the design stage could include sealing sources to prevent odor leakage and designing the height and orientation of vents to avoid problems. Evaluate measures in levels of “High,” “Low” and “None.” Exclude this item from assessment if there are no facilities or handled materials that could generate odors. Residential buildings are excluded, because they are not expected to include such odor sources.

2) Installation of equipment to eliminate or reduce offensive odors.

Evaluate equipment used to remove or reduce emitted odors. Development of odor-removing systems has progressed in recent years, so there is a range of options available for such systems, to suit the scale of the building. The Ministry of the Environment has published a booklet entitled “Guidebook of Odor Control Equipment 2004.” Evaluate measures in levels of “High,” “Low” and “None,” according to the size and number of devices selected. Exclude this item if deodorizing equipment is not installed because odor countermeasures taken under 1) are sufficient, or if no odor source exists.

3) Measures against waste generated by building operation

Evaluate measures against odors caused by the storage and collection of waste materials. In particular, organic waste generates odors, so careful attention must be paid to building garbage collection areas with structures to reduce the spread of odor, and to the ventilation methods used at collection areas. Measures to isolate collection areas from adjacent plots are also effective. Evaluate as “High” or “Low” according to the scale of the measures used.

● 3. Wind Damage & Sunlight Obstruction

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated , 0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated , 0.2 ≦Credit Ratio (3)< 0.4
Level 3	On the Efforts to Be Evaluated , 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated , 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated , 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I.** Prediction of wind damage 1) Conduct a preliminary survey of wind speed and direction and related factors in the area.
2	1	0	2）Use of simulations and other tools to predict wind damage.
2	1	0	**II.** Restriction of wind damage 3）Measures to restrict generation of strong wind
2	1	0	4）Measures to reduce the impact of wind damage
2	1	0	**III.** Restriction of sunlight obstruction 5）Consideration of shade cast on adjacent sites
2	1	-	6）Other

(1) Total Credits	(2) Maximum Credits=	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Evaluate measures to restrict wind damage and sunlight obstruction. Both wind damage and sunlight obstruction concern the form and volume of the building, and are similar in the way they affect the surroundings. It is also common for them to be considered at the same design stage. Therefore, wind damage and sunlight (sunlight obstruction) will both be evaluated under this item. Prediction is emphasized with wind damage, so that should also be considered in the assessment.

Evaluate a building as level 3 as the uniform score for this assessment item, if it causes almost no wind damage or sunlight obstruction, and has almost no impact on its surroundings.

1）Conduct a preliminary survey of wind speed and direction and related factors in the area.

Identify aspects of the wind environment, such as wind speed, wind direction and prevailing winds to predict wind damage. Evaluate as “Low” if existing data is used, such as local meteorological data (AMEDAS satellite data) or data from a nearby meteorological observatory. Evaluate as “High” if the existing data is supplemented, in a more detailed study, with wide-area meteorological data or wide-area atmospheric environment forecasting systems using topographical information, or even actual field measurement is carried out. If a survey is planned for the Preliminary Design stage, evaluate it according to its content.

2）Use of simulations and other tools to predict wind damage.

Evaluate as “High” if numerical simulation of fluid flow, wind tunnel testing and other methods are used on the current situation and the planned building, considering topography of the site area, the building and surrounding green space, to predict wind damage. Evaluate as “Low” if building form and positioning, relative to wind direction, were considered by paper example. If a survey is planned for the Preliminary Design stage, evaluate it according to its content.

3）Measures to restrict generation of strong wind

Effective measures using the form and orientation of the building include using low-rise rooftops to stop winds from high-rise sections reaching the ground and using roof forms to lead winds away. Evaluate the anticipated level of effect as “High,” “Low” and “None” according to the measures taken in the building itself against wind damage.

4）Measures to reduce the impact of wind damage

Under this item, evaluate measures to mitigate the impact of strong winds generated by the building, its related structures and exterior structures on areas used for human activity. This assessment covers structural measures such as building eaves or arcade roofing, wind baffling with trees and plants, and the use of shielding elements such as fences. Evaluate the anticipated level of effect as “High,” “Low” and “None” according to scale of the measures taken.

5）Restriction of sunlight obstruction

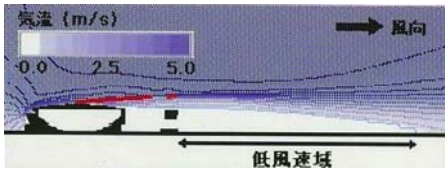
Evaluate measures affecting adjacent plots which go beyond the requirements of shade regulations, if any. As a guideline, award “High” if efforts satisfy standards one rank above shade regulations in the area concerned, and “Low” if the measures fall short of that level. Exclude this item if there are no shade regulations in the region.

* “One rank above” means that, for example, in an area where the shade regulation limits shade on adjacent commercial areas to 5 hours/ 3 hours (at 5m, 10m), the next higher standard is for Semi-residential Zone, set at 4/ 2.5 hours. The level would be “High” if the standard for Semi-residential Zone was satisfied.

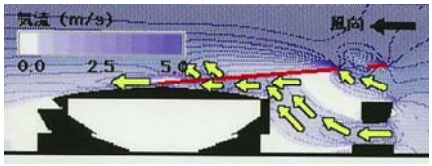
■Reference 1) Conduct a preliminary survey of wind speed and direction and related factors in the area.

<Saitama Super Arena>

The building roof configuration and its plan form were determined on the basis of the results of a wide-area atmospheric simulation, as countermeasures against the north wind, which is the prevailing wind in winter. The plaza of zelkova trees on the downwind side of the building was given protection against strong winds. The wind from the sea in summer is deliberately drawn in through the front opening of the arena, to vent through the opening on the north side, making efficient use of natural ventilation and securing pleasant airflow through the streets of the area.

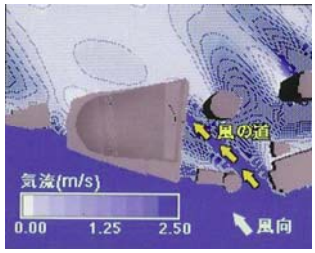


Results of analysis of wind conditions due to prevailing winter winds (cross section)



Results of analysis of wind conditions due to prevailing summer winds (cross section)

Results of analysis of wind conditions due to prevailing winter winds (plan)



Results of analysis of wind conditions due to prevailing summer winds (plan)

Design: MAS 2000 Design Team
(Leader: Nikken Sekkei)
In association with: Ellerbe Becket
Flack + Kurtz Consulting Engineers
Technical cooperation: Taisei Corporation
(Documentation provided by Taisei Corporation)

● 4. Light Pollution

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	On the Efforts to Be Evaluated , 0 ≦Credit Ratio (3)< 0.3
Level 4	On the Efforts to Be Evaluated , 0.3 ≦Credit Ratio (3)< 0.6
Level 5	On the Efforts to Be Evaluated , 0.6 ≦Credit Ratio (3)< 1.0

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	1) Outdoor illumination and light that spills from interiors
2	1	0	2) Light pollution from advertising displays
2	1	0	3) Reflected solar glare from building walls
(1) Total Credits=			(2) Maximum Credits= / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

Evaluate light pollution caused by buildings includes exterior lighting and nightlight spill from the interior, lighting for advertising displays, and glare reflecting from the building. The Ministry of the Environment of Japan published its Light Pollution Countermeasure Guidelines in March 1998, and local governments are adopting their own Local Illumination Environment Plan in accordance with the guidelines.

For this item, the basic approach should be to use the level of compliance with the Light Pollution Countermeasure Guidelines or Local Illumination Environment Plan as the judgment criterion.

1) Outdoor illumination and light that spills from interiors.

Evaluate according to the level of compliance with the “Checklist (check sheet) on exterior illumination and similar fixtures” in the Light Pollution Countermeasure Guidelines or regional lighting plans (if one has been adopted for the region concerned).

None: Almost no points satisfy the checklist.
Low level: Only some of the checklist points are satisfied.
High level: A majority of the checklist points are satisfied.

2) Light pollution from advertising displays

Evaluate lighting of billboards and similar structures erected on the building. (Exclude this item if there are no billboards.) Refer to the “Guide to Billboards etc.” stated in the Light Pollution Countermeasure Guidelines when making this assessment.

None: No measures have been taken in connection with the nocturnal illumination of billboards, and a severe impact on the surroundings is observed.
Low level: No significant measures have been taken in connection with the nocturnal illumination of billboards.
High level: No nocturnal illumination of billboards is used, or measures comply with the “Guide to Billboards etc.”

3) Reflected solar glare from building walls

Evaluate measures to mitigate the glare cast on the surround area by reflection of daylight from walls. Glare caused by reflection of daylight from buildings can cause unanticipated impact, particularly in office buildings with large areas of glass. Therefore, this is a matter that must be considered with great care.

None: Reflected glare from building walls is observed to cause a severe impact on the surroundings.
Low level: Reflected glare from building walls is not observed to cause any major impact on the

surroundings.
High level: Building walls (including glass) do not generate any reflected glare.

■ Reference 1)
Summary of the "Guide to Street Lighting Fixtures" in Light Pollution Countermeasure Guidelines (the Ministry of Environment of Japan)

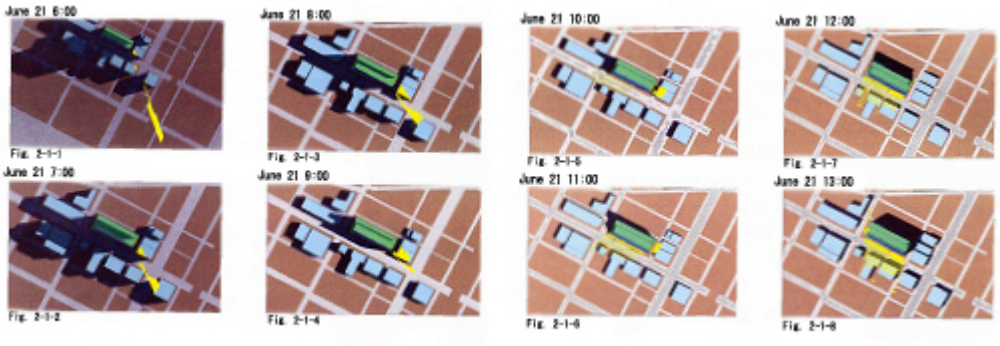
<table>
<tr><th>Regulations</th><th>Assessment</th><th colspan="2">Content</th></tr>
<tr><td>Coefficient of utilization</td><td>No numerical target</td><td colspan="2">Designers are encouraged to arrange light fixtures for higher coefficient of utilization.</td></tr>
<tr><td rowspan="4">Upward light output ratio</td><td rowspan="4">Evaluate according to ULOR (upward light output/ lamp output)</td><td>Lighting environment I: 0%</td><td>Safety: Regions where there is major impact on the natural environment, natural parks, rural areas, farmland etc.</td></tr>
<tr><td>Lighting environment II: 0~5%</td><td>Security: Areas where most roads and streets have street lamps, villages, rural areas, suburban residential areas etc.</td></tr>
<tr><td>Lighting environment III: 0~15%</td><td>Comfort: Regional cities, satellite municipalities of major cities, urban residential areas and other areas with street lighting and also some outdoor {illuminated} advertising.</td></tr>
<tr><td>Lighting environment IV: 0~20%</td><td>Entertainment: City centers, busy streets, commercial districts, main urban roads and other areas with a high density of exterior lighting and outdoor advertising.</td></tr>
<tr><td rowspan="3">Glare</td><td rowspan="3">Following the points under "Glare restriction" in the "Standard for Exterior Public Illumination for Pedestrians" by the Illumination Engineering Institute of Japan.</td><td>Height of light fixtures</td><td>Luminosity at an angle of 85˚ from the vertical</td></tr>
<tr><td>Up to 4.5m
4.5m ~6.0m
6.0m~10.0m</td><td>Not exceeding 2,500cd
Not exceeding 5,000cd
Not exceeding 12,500cd</td></tr>
<tr><td colspan="2">Luminance of the light-emitting areas at an angle of 85˚ from the vertical: Not exceeding 20,000cd (Can be estimated from the luminosity at an angle of 85˚ from the vertical)</td></tr>
<tr><td rowspan="2">Energy saving</td><td rowspan="2">Evaluate according to overall efficiency (lamp output/ ballast input power)</td><td>Lamp input power</td><td>Overall efficiency</td></tr>
<tr><td>200W or more
Less than 200W</td><td>60(lm/w) or more
50(lm/w) or more</td></tr>
</table>

■Reference 2）“Checklist (check sheet) on exterior illumination and similar fixtures,” Light Pollution Countermeasure Guidelines

Check items	Example measures
1. Selection and installation positions of lighting equipment. ■Lighting which does not comply with the “Guide to Street Lighting Fixtures” is used for roads or streets. ■For spotlights, the axis of the beam is above the horizontal.	→Review lighting equipment selection. Refer to the “Guide to Street Lighting Fixtures.” →Adjustment and design so that the beam axis is within 70° of downward perpendicular.
2. Range of illumination ■Illumination exceeds the necessary range. ■Installed lighting exceeds the necessary brightness.	→Reconsideration of lighting equipment installation position and light emission direction. →Consider changing to lighting equipment with characteristics of luminous intensity distribution. →Reconsider placement of lighting equipment. Consider eliminating lighting equipment.
3. Light pollution check ■Waste light is leaking upwards. ■There is potential impact on nearby buildings (houses, hospitals etc.). (Light could interfere with residents’ sleep or other aspects of life). ■Uncomfortable glare could affect pedestrians and drivers. (Cars, bicycles) ■Light pollution could affect crops and livestock. ■Light pollution could affect wild flora and fauna.	→For road and street lighting: Review lighting equipment selection. → Refer to the “Guide to Street Lighting Equipment”. →For spotlights: Devise better installation methods. Louver installation. →Other lighting: Review lighting equipment selection to consider characteristics of luminous intensity distribution. →For road and street lighting: Review of lighting equipment selection. Use lighting equipment with glare characteristics compliant with the “Guide to Street Lighting Equipment.” →For spotlights: Devise better installation methods. Louver installation. →Other lighting: Review lighting equipment selection to consider characteristics of luminous intensity distribution. →For road and street lighting: Review of lighting equipment selection. Use lighting equipment with glare characteristics compliant with the “Guide to Street Lighting Equipment”. →For spotlights: Devise better installation methods. Louver installation. →Other lighting: Review lighting equipment selection to consider characteristics of luminous intensity distribution. →Review lighting equipment selection on the basis of light distribution characteristics. →Cut direct light by using better installation methods or installing louvers. →Reconsider whether lighting equipment should be installed. →Review lighting equipment selection on the basis of characteristics of luminous intensity distribution. →Cut direct light by using better installation methods or installing louvers.
4. Operation and management ■There is no plan for setting appropriate lighting periods. ■Lighting even late at night is planned. ■There is no operation plan for maintenance.	→Set appropriate operation management policies. →Consider whether lighting should be turned off at night. →Consider whether lighting could be reduced at night. →Consider the implementation of tasks such as regular maintenance.

■Reference 3) Countermeasures against light pollution by reflected glare from buildings

It is particularly important to consider light reflecting on the surrounding area if the building has a glass facade. If the facade is curved or inclined, it can extend light pollution effects in a surprisingly wide range, so light pollution must be thoroughly considered in advance. Recently, computers have been able to run simulations as shown below, so it is easy to identify the impact of reflected light.



(Documentation provided by Nihon Sekkei)

The following are the main countermeasures against reflected light.

	Method	Content
Countermeasures on the reflecting side	Reduced reflectance	Application of a anti-reflection film on the inner side of the reflecting surface, or a coating applied to the glass, can cut reflectance.
	Diffuse reflection	Measures such as surface treatments and template glass can make the reflection more diffuse.
	Adjusted reflection angle	The angle at which the glass is mounted can be adjusted to reduce the impact of reflections.

(Caution)
Glass may become prone to thermal cracking due to higher solar absorbance rate. Glass with surface treatment is limited by wind pressure strength consideration.
■Bibliography 38）

● 5. Heat Island Effect

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, Credit Ratio (3) = less than 0.2
Level 2	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.2 or more, less than 0.4
Level 3	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.4 or more, less than 0.6
Level 4	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.6 or more, less than 0.8
Level 5	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.8 or more

Efforts to be evaluated

Level of efforts		Efforts
Present	None	
2	0	1) Air movement leaving the site has been considered, and efforts have been made to reduce thermal impact. [1] Buildings are arranged so that they do not block existing paths of air movement. [2] Buildings are arranged so that they do not block paths of air movement in midsummer. [3] Provision of paths within the site, and provision of adequate spacing between buildings. [4] Appropriate building height and form for block spacing to avoid blocking air movement.
2	0	2) Exterior cladding materials have been considered, and efforts have been made to reduce thermal impact outside the site. [1] Select highly water-retaining and water-permeable path paving materials (paved surfaces). [2] Selection of paving materials for paths etc. with low solar absorption rate
2	0	3) Cladding materials of outside wall have been considered, and efforts have been made to reduce thermal impact outside the site. [1] Selection of building roofing materials with low solar absorption rate and high long-wavelength emission rates. [2] Selection of wall materials with low solar absorption rates. [3] Promotion of greening on building exterior surfaces (roof and wall).
2	0	4) Efforts have been made to reduce artificial heat emissions. [1] Use of energy-saving perimeter materials. [2] Use of energy-saving equipment. [3] Exploitation of natural energy (sunlight, wind, etc.) [4] Exploitation of unused energy (urban waste heat present in areas near the site, etc.). [5] Introduction of high-efficiency infrastructure [6] Shifting the heat discharge peak. * On evaluate when considering daytime conditions.
(1) Total Credits=		(2) Maximum Credits= / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

Evaluate measures to assist in reducing the thermal load on areas outside the site. Check whether or not any efforts have been made on the following points, and evaluate them on two levels. Efforts to improve the thermal environment on site (the Q side) should be evaluated under "Q-3 ●3.2 Improvement of the Thermal Environment on Site."

1) Air movement leaving the site has been considered, and efforts have been made to reduce thermal impact.

Consideration of air movement leaving the site should be evaluated if efforts have been made to address building placement and orientation, spacing between buildings, the height and form of the building, and other factors. Evaluate in levels of "Present" and "None" according to scale.

2) Exterior cladding materials have been considered, and efforts have been made to reduce thermal impact outside the site.

Evaluate exterior paving materials etc. for efforts to alleviate thermal impact on areas outside the site. When materials have been selected with water retention and permeability properties, or with low solar absorption rate, award "Present" if such materials cover a majority of the exterior area, and "None" for a smaller area.

3) Cladding materials of outside wall have been considered, and efforts have been made to reduce thermal impact outside the site.

Evaluate building cladding materials etc. for efforts to alleviate thermal impact on areas outside the site. When evaluating measures such as selecting materials of low solar absorption rate and greening on the exterior of the building (roof, walls etc.), award "Present" if any of them has been used on a large scale and "None" if any of them has been used on a smaller scale.

4) Efforts have been made to reduce artificial heat emissions.

Evaluate measures to alleviate the thermal impact of artificial heat emissions on areas outside the site. Evaluate energy saving methods such as building cladding (improvement of perimeter heat insulation performance and reduction of sunlight intake through openings), energy saving equipment, natural energy, unused energy and high-efficiency infrastructure, as well as peak shifting of daytime heat discharge. Evaluate these measures at "Present" level if they are used on a large scale, and "None" if they are on a smaller scale.

● 6. Load on Local Infrastructure

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated , 0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated , 0.2 ≦Credit Ratio (3)< 0.4
Level 3	On the Efforts to Be Evaluated , 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated , 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated , 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	**I. Efforts to reduce rainwater drainage load** 1) Measures to encourage rainwater percolation to the ground (Topsoil conservation, permeable paving, permeable catch basin, percolation pipes, etc.)	
2	1	0	2) Provision of facilities for temporary rainwater storage (Installation of rainwater storage tanks, drainage basins, drainage facilities etc.)	
2	1	-	3) Other	
2	1	0	**II. Efforts to reduce sewage treatment load** 4) Advanced purification of sewage and reduction of the discharge volume	
2	1	-	5) Other	
2	1	0	**III. Efforts to reduce automobile usage** **IIIa. Use of bicycles (use of alternative modes of transport)** 6) Provision of bicycle parking space for building users	
2	1	0	7) Consideration for the convenience of bicycle parking area users (Make sure the parking area is easy to move in and out of, and is in a convenient location).	
2	1	-	8) Other	
2	1	0	**IIIb. Efforts to provide appropriate car parking space.** 9) Calculation of traffic loads generated on surrounding roads (when planning car parking)	
2	1	0	10) Provision of an appropriate number of parking spaces (As a way of avoiding congestion and street parking in nearby roads)	
2	1	0	11) Provision of parking facilities for unloading goods vehicles. (Not applied to “Apartments.”)	
2	1	0	12) Consideration for the placement of parking lot access roads	
2	1	-	13) Other	
2	1	0	**IV. Efforts to reduce garbage treatment load** 14) Facilities and equipment for sorted garbage collection (Separate garbage boxes, a stock yard for sorted garbage, etc.)	
2	1	0	15) Devices and facilities for reducing the volume and weight of garbage and composting suitable waste (disposers, composters etc.).	
2	1	-	16) Other	
(1) Total Credits=			(2) Maximum Credits=	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Evaluate measures to reduce environmental loads on local infrastructure generated by building operation.

1) Measures to encourage rainwater percolation to the ground

The efforts to be evaluated include permeable paving, permeable catch basin, percolation trenches and other percolation facilities, as well as the provision of areas of planted vegetation or bare ground to enable percolation through the surface in the exterior of the site.

If government directives or other regulations make measures to restrict rainwater flow mandatory, and measures are implemented to comply with such directives, the level of the effort should be rated as "Low." Rate it “High” if such measures are used beyond the specified quantity. If there is no government direction, rate the level of effort as “Low” if measures to assist percolation of rain to groundwater are used on less than half of the area of the site, and as “High” if they cover more than half.

2）Provision of facilities for temporary rainwater storage

Efforts to be evaluated include installing storage tanks in underground pits, small storage tanks for each dwelling, crushed stone tanks under exterior (surface) on site and parking lots, drainage facilities, and temporary rainwater storage facilities for rooftop planting. Evaluate rainwater flow suppression as “Low” if it is at a quantitative level based on government direction, and as “High” if that level is exceeded. Exclude this item if no rainwater percolation facilities are installed because rainwater percolation to the groundwater has been deemed undesirable by government directive, related laws and ordinances, or by soil surveys. If no government directives are applicable, provision of less than 300m^3/ha of storage should be rated "Low" and 300m^3/ha or more should be rated "High."

4) Advanced purification of sewage and reduction of the discharge volume

Under this item, evaluate the introduction of sewage purification systems and sewage reuse systems as measures to reduce the sewage treatment load. Rate the efforts as “High" or “Low” depending on the level of water quality purification, or the level of waste water reduction.

In areas which are not served by main sewerage, evaluate the installation of septic tanks with performance that exceeds local water quality standards. Even in areas with developed mains sewerage, the installation of septic tanks with the aim of further improving water quality should be evaluated (such as the installation of septic tanks where a disposer is used, with water being discharged after treatment).

6) Provision of bicycle parking space for building users

Evaluate provision of bicycle parking space as a measure to promote bicycle usage. Rate provision as “High” if it is adequate in comparison to the number of building users. When provision of bicycle parking is mandatory, rate “High” if the mandatory provision is exceeded, and “Low” if provision is at the mandatory level or below.

7) Consideration for the convenience of bicycle parking area users

Evaluate efforts to improve convenience for the users of bicycle parking areas, as a measure to promote bicycle usage. Consider the ease of entry and exit, layout planning for easy use and other aspects. Evaluate as “High” or “Low” according to the level of the facilities.

9) Calculation of traffic loads generated on surrounding roads

A calculation to forecast traffic load generated by related car use is effective for planning appropriate measures to handle that load. Evaluate as “High” or “Low” depending on the level of the calculation. Exclude this item for small-scale buildings, or in other cases where the impact on nearby traffic will be very small.

10) Provision of an appropriate number of parking spaces

It is very important to provide an “appropriate” number of car parking spaces as a measure to reduce the traffic burden generated by car usage associated with the operation of the building. Provision of sufficient parking space is an effective measure against street parking, but it may also encourage car usage. In some cases, provision of car parking for a building is mandatory as a way to prevent street parking in city centers. These issues show that the “appropriate” amount of parking space varies with the location, and should be investigated thoroughly at the planning stage. Evaluate as “High” or “Low” according to the level of the measures used.

11) Provision of parking facilities for unloading goods vehicles.

Evaluate on-site provision of parking facilities for unloading goods vehicles as a means of relieving congestion on nearby roads. Rate provision as “High” if sufficient parking space is provided for the purpose. (Not applied to “Apartments.”)

12) Consideration for the placement of parking lot access roads

The position of the parking lot entrance and exit, and the form of the access road can cause congestion on the road in front of the parking lot. These aspects must be considered carefully, to enable vehicles to move in and out smoothly.

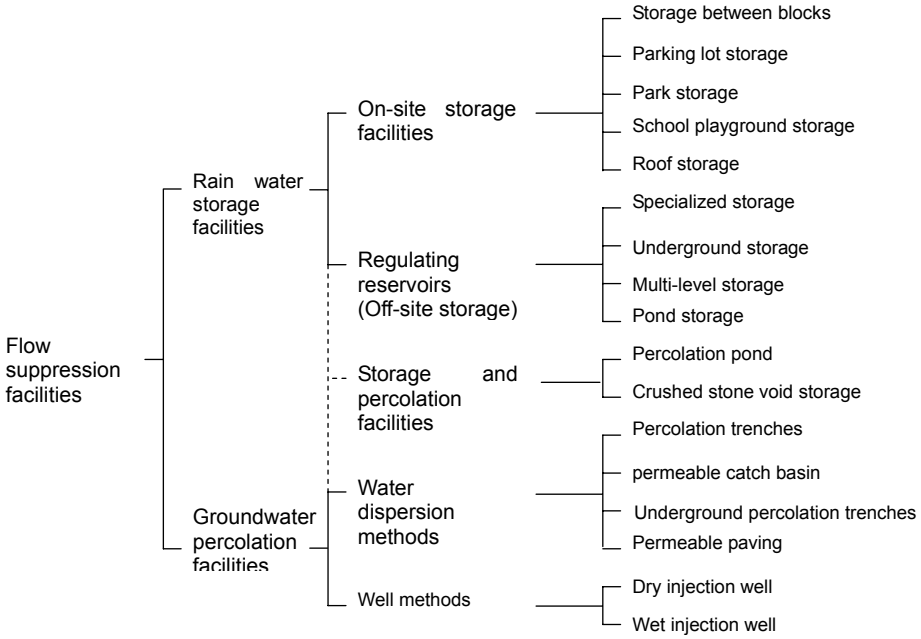
14) Facilities and equipment for sorted garbage collection/ 15) Devices and facilities for reducing the volume and weight of garbage and composting suitable waste

Evaluate measures used to reduce the processing load imposed by waste materials generated by the building in operation. Garbage sorting is a way of encouraging recycling and reuse. Evaluate whether there is enough space in the garbage storage area (stock yard) to enable proper sorting. Efforts to

reduce the volume and quantity of garbage make garbage collection easier by reducing the amount, and encourage recycling. Evaluate equipment such as garbage compactors installed inside the building. Also evaluate equipment to compost organic waste generated in the building, or to use its biomass as energy. Evaluate these measures as “High” or “Low” according to their level.

■Reference 1) Types of rain water flow suppression facilities

A Chart below shows types of rain water flow suppression facilities. The main type of rain water flow suppression facility now in use is the groundwater percolation construction method, which is chosen as a way of making effective use of land and raising the efficiency of rain water flow suppression functions.



■Bibliography 39）

■ Reference 2) Sewage water reuse systems

There are various treatment methods (biological, physical, chemical and other methods) which can be selected and combined according to the quality of the raw water and its intended uses. If systems for using gray water are planned, suitable treatment methods will have to be selected to produce the water quality needed for the intended use, and the water saving effects should be combined with energy saving and cost reduction in the system. Care must also be taken to prevent accidental drinking of non-potable water, and to avoid odors from raw water.

Water quality targets for water applications

Target	Flushing water			Sprinkling water*1	Scenic water*4	Scenic water*4
	Standard 1*1	Standard 2*2	Standard 3*3			
Intestinal bacteria count	Not exceeding 10/ml	Not exceeding 10/ml	Not exceeding 10/ml	Must not be detectable	Not exceeding 1000/ml	Not exceeding 50/100ml
BOD or COD	—	Biological treatment method: Not exceeding 20mg/l Membrane treatment method: Not exceeding 30mg/l	—	—	Not exceeding 10mg/l	Not exceeding 3mg/l
pH	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6	5.8~8.6
Turbidity	—	—	—	—	10˚C or less	5˚C or less
Odor	Must not cause discomfort	Must not cause discomfort	Must not cause discomfort	Must not cause discomfortと	Must not cause discomfort	Must not cause discomfort
Color	—	—	—	—	Not exceeding 40˚C	Not exceeding 40˚C
Appearance	Must not cause discomfort	Must not cause discomfort	Must not cause discomfort	Must not cause discomfortこと	—	—

■ Bibliography 1) The former Ministry of Construction, Technical guidelines on the recirculation and use of treated sewage water (Draft), 1981. *2 "Treatment of plumbing systems for waste water reuse" Notification from The former Ministry of Construction, 1981. *3 "Setting provisional standards for toilet flushing water from graywater mains drawn from reused water" Notification from the former Ministry of Health and Welfare, 1981. *4 Advanced Treatment Council, Water quality testing manual for treated sewage water used for landscaping and percolation (Draft), the former Ministry of Construction, 1990.

2. Execution Design and Construction Completion Stage

Q-1 Indoor Environment

When evaluating “Hospitals,” “Hotels” and “Apartments” for Q-1, evaluate the common properties of each building (hospital outpatient waiting rooms, hotel lobbies, apartment entrance halls etc.). For private areas, (hospital bedrooms, hotel guest rooms, apartment housings), base the assessment on assessment of Residential and Accommodation Sections.

● 1. Noise & Acoustics

● 1.1 Noise

● 1.1.1 Background Noise

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

unit：dB(A)

Entire Building and Common Properties				
Building type	Off･Hsp･Htl･Apt･Fct	Sch	Rtl･Rst	Hal
Level 1	More than 50	More than 45	More than 55	More than 40
Level 2	More than 47, 50 or less	More than 42, 45 or less	More than 52, 55 or less	More than 37, 40 or less
Level 3	More than 43, 47 or less	More than 38, 42 or less	More than 48, 52 or less	More than 33, 37 or less
Level 4	More than 40, 43 or less	More than 35, 38 or less	More than 45, 48 or less	More than 30, 33 or less
Level 5	40 or less	35 or less	45 or less	30 or less

□ Commentary

Evaluate noise level for background noise according to the level of air conditioning noise in the interior and traffic noise penetrating from the exterior.

Evaluate the target background noise level at the Execution Design Stage, and evaluate from measured values on completion. The reference below indicates the noise levels by their intrusiveness and their impact on conversation, both direct and via telephone.

For building types classified as “Halls” evaluate building types that particularly require anti-noise measures, such as meeting halls, theaters and movie theaters. Exclude other building types.

Residential and Accommodation Sections		
Building type	Hsp	Htl･Apt
Level 1	More than 50	More than 45
Level 2	More than 47, 50 or less	More than 42, 45 or less
Level 3	More than 43, 47 or less	More than 38, 42 or less
Level 4	More than 40, 43 or less	More than 35, 38 or less
Level 5	40 or less	35 or less

■Reference) Allowable interior noise levels

(Reference) ■Allowable interior noise levels

dB(A)	20	25	30	35	40	45	50	55	60
NC~NR	10~15	15~20	20~25	25~30	30~35	35~40	40~45	45~50	50~55
Intrusiveness	Silent — Very quiet — Not significantly noticeable — Perceived noise — Noise cannot be ignored								
Impact on conversation	A whispering voice is audible from 5m away — Possible from 10m apart Telephone use (normal) — Possible from 3m apart Telephone use (bearable) — Loud conversation (3m) Telephone use (unbearable)								
Studios	Silent room	Studio for newsreading etc.	Radio studio	Television studios	Mixing room	General offices			
Venues and halls		Music hall	Theater (medium)	Stage theaters	Movie theater, planetarium		Hotel lobbies		
Hospitals		Hearing test room	Special sickrooms	Sickrooms	Examining room	Laboratories	Waiting rooms		
Hotel and residential				Reading rooms	Bedrooms	Banquet halls	Lobbies		
General offices				Large meeting rooms	Reception rooms	Meeting rooms			Typing and accounting rooms
Public buildings				Auditorium	Museums	Library	Auditorium/ gymnasium	Indoor sports facilities	
Schools and churches				Music classroom	Chapels	Research rooms and classrooms		Corridors	
Commercial buildings				Jewelers and art shops	Music cafes	Bookshops	Banks and restaurants	Canteens	

(Assessment method based on measurements)
・If noise is constant, normal noise meters may be used, but integral sound meters should be used for variable noises such as traffic.
・Measurement conditions when using an integral sound meter.
Measurement position: Near the center of the room, 1.2m above floor level.
Measurement duration: 10 minutes
Properties: A properties

■Bibliography 40), 41), 42）

● 1.1.2 Equipment Noise

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	No noise countermeasures. (Less than two countermeasures at all among the efforts to be evaluated.)
Level 2	Some measures taken. (Two or three noise countermeasures used from among the efforts to be evaluated.)
Level 3	Noise countermeasures used. (Four or five noise countermeasures used from among the efforts to be evaluated.)
Level 4	Countermeasures at a moderately high level. (Six or seven noise countermeasures used from among the efforts to be evaluated.)
Level 5	Countermeasures at an advanced level. (All noise countermeasures used from among the efforts to be evaluated.)

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	No noise countermeasures. (Less than two countermeasures at all among the efforts to be evaluated for equipment noise.)
Level 2	Some measures taken. (Two or three equipment noise countermeasures used from among the efforts to be evaluated.)
Level 3	Noise countermeasures used. (Four of five equipment noise countermeasures used from among the efforts to be evaluated.)
Level 4	Countermeasures at a moderately high level. (Six or seven equipment noise countermeasures used from among the efforts to be evaluated.)
Level 5	Countermeasures at an advanced level. (All equipment noise countermeasures used from among the efforts to be evaluated.)
Building type	Apt
Level 1	No noise countermeasures. (Less than two measures are taken on any of the efforts to be evaluated for equipment noise)
Level 2	
Level 3	Noise countermeasures used. (2~3 equipment noise countermeasures used from among the efforts to be evaluated)
Level 4	
Level 5	Countermeasures at an advanced level. (All equipment noise countermeasures used from among the efforts to be evaluated)

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Efforts to be evaluated <Types of equipment noise and examples of countermeasures>

Building types	Types of equipment noise	Examples of countermeasures
Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct	Vents and intakes	Low-noise vents, low-noise intakes, positions, air speed and volume, etc.
	Interior air conditioning equipment	Noise prevention covers, positions etc.
	Noise from the machine room (penetrating noise)	Noise prevention covers, sound absorption and Sound insulation for the machine room, position etc.
	As above (noise transmitted through solids)	Anti-vibration platform, anti-vibration rubber elements, etc.
	Noise from ducts and pipes (penetrating noise)	Sound absorber ducts, sound absorber elbows, sound absorber boxes, sound insulating pipe cladding, position etc.
	As above (noise transmitted through solids)	Anti-vibration suspension or supports, flexible joints, anti-vibration treatment of penetrating parts.
	(Exterior) Noise from cooling towers	Baffles, anti-vibration supports, positioning etc.
	(Exterior) Noise from intakes and vents	Positioning, appropriate air volume and speed, etc.
Apt	1) Water supply and drainage noises from toilets, bathrooms etc.	Anti-noise pipe cladding, anti-vibration rubber support fittings, positioning, etc.
	2) Water hammer	Use of appropriate water pressure, selection of preventive fixtures, etc
	3) Noise from air conditioning room units	Selection of low-noise equipment etc.
	4) Noise from air conditioning external units	Anti-vibration rubber supports, anti-vibration mats, selection of low-noise equipment types, etc.
	5) Ventilation	Selection of low-noise equipment etc.

☐ Commentary

For equipment noise countermeasures, evaluate measures against noise generated by building equipment and services, such as air conditioning equipment and drainage equipment. For example, air conditioning

equipment generates noise in its compressors, motors and fans, and that noise is carried to building interiors through ducts, walls and structural elements to occupied areas inside the building. Once noise has been generated and emitted into the building interior, it is often very difficult to control. Therefore, it is important to start planning for noise source countermeasures and anti-noise design from the design stage. Evaluate whether adequate countermeasures were taken against each type of noise. There is no need to use all the measures offered as examples of countermeasures. If the equipment does not generate noise, noise countermeasures should be deemed to have been taken.

■Bibliography 43）

● 1.2 Sound Insulation

● 1.2.1 Sound Insulation of Openings Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Evaluate the sound insulation performance of sash windows and other furniture on the building openings. The higher the sound insulation performance of the openings, the better external noise from traffic and other sources can be blocked from entering. Retail stores have few openings, so they need not be evaluated. Where there are multiple openings, evaluate the type with the lowest performance.

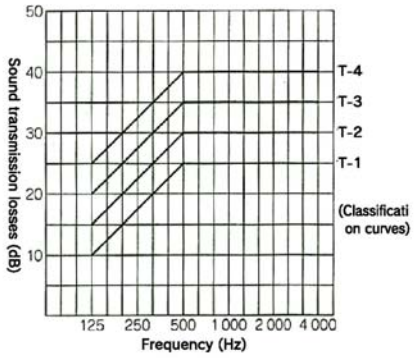
Entire Building and Common Properties	
Building type	Off･Sch･Rst･Hsp･Htl･Apt･Fct
Level 1	Less than T-1
Level 2	(Inapplicable)
Level 3	T-1
Level 4	(Inapplicable)
Level 5	T-2 or more

Residential and Accommodation Sections	
Building type	Hsp･Htl･Apt
Level 1	Less than T-1
Level 2	(Inapplicable)
Level 3	T-1
Level 4	(Inapplicable)
Level 5	T-2 or more

Reference) Sound insulation classification curves for sash window etc. (JIS A 4706)

☐ Commentary

Evaluate the sound insulation performance of sash windows and other furniture on the building openings. The higher the sound insulation performance of the openings, the better external noise from traffic and other sources can be blocked from entering. The assessment indicator is classification of sound insulation T. This is an indicator for assessment of sound insulation performance for sash window and similar elements. The sound insulation curves for sound transmission losses in each frequency band, and their nomenclature, have been standardized (see the diagram on the right). Transmission losses for each frequency are plotted on sound insulation curves. The sound insulation classification is the classification for which values in all frequency bands clear the corresponding curve.



Sound insulation classification curves for sash windows etc. (JIS A 4706)

■Bibliography 41)

● 1.2.2 Sound Insulation of Partition Walls

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rst・Fct
Level 1	Less than D-30
Level 2	D-30
Level 3	D-35
Level 4	D-40
Level 5	D-45 or more

Residential and Accommodation Sections	
Building type	Hsp
Level 1	Worse than D-35
Level 2	D-35
Level 3	D-40
Level 4	D-45
Level 5	D-50 or better

Building type	Htl
Level 1	Worse than D-40
Level 2	D-40
Level 3	D-45
Level 4	D-50
Level 5	D-55 or better
Building type	Apt
Level 1	Worse than D-40
Level 2	D-40
Level 3	D-45
Level 4	D-50
Level 5	D-55 or better

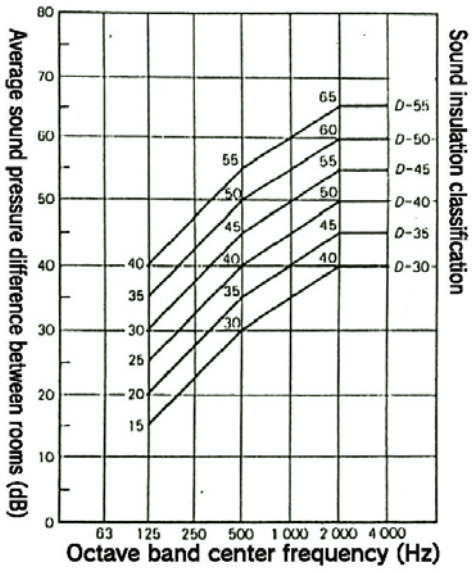
☐ Commentary

Retail stores commonly have no partitions between sales areas, so they need not be evaluated for sound insulation performance of partition walls.

For the sound insulation performance of partition walls, use interior sound pressure level diffrenceas an indicator to evaluate sound insulation between rooms. The assessment indicator is classification of air-born sound insulation classification D for the sound pressure level difference between rooms. D number is an indicator for assessment of sound insulation performance for the building. The contour lines for sound pressure difference between rooms in each frequency band, and their nomenclature, have been standardized (see the diagram on the right). If the D number is found from measured values, plot the level difference value at each frequency band over the contours. The sound insulation class is the highest curve for which the values in all frequency bands clear the curve.

For assessment, use sound pressure level differences measured as described in "Method for Field Measurement of Sound Pressure Level Difference," JIS A 1417, and calculated by substitution into the building sound insulation class under the "Method for Measurement of Sound Insulation of Buildings and Building Elements," JIS A 1419. Instead of using measured values, predictive methods such as "Building Sound Insulation Design Documents," (Architectural Institute of Japan, 1998) may also be used to find predicted values for the sound insulation classification D-value for sound pressure difference between rooms. Retail stores commonly have no partitions between sales areas, so they need not be evaluated for sound insulation performance of partition walls.

Reference) Sound insulation classification for sound pressure level difference. (JIS A 1419)



- 1.2.3 Sound Insulation of Floor Slabs (light-weight impact source)

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Sch
Level 1	Worse than L-65
Level 2	L-65
Level 3	L-60
Level 4	L-55
Level 5	L-50 or better

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Worse than L-55
Level 2	L-55
Level 3	L-50
Level 4	L-45
Level 5	L-40 or better

☐ Commentary

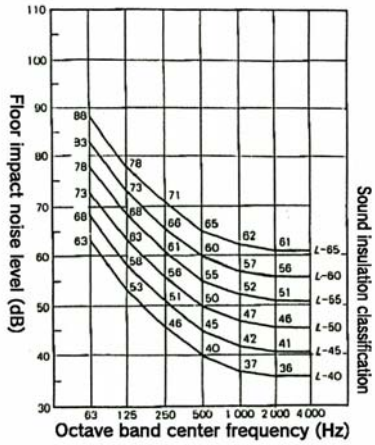
Use sound insulation classification L for floor impact sound level as the assessment indicator.

Evaluate partition sound insulation performance according to the floor impact sound level. The assessment indicator is classification of floor impact sound insulation L for floor impact sound level. The contour lines for floor impact sound level in each frequency band, and their nomenclature, have been standardized.

Impact noise is classified into two types, with assessment criteria set for each. Light floor impact noise is the kind of light noise generated by dragging a chair on a hard floor. Heavy floor impact noise comes from heavier impacts, such as children jumping.

Impact level noise level differences measured according to JIS A 1418 "Method for Field Measurement of Impact Sound Level of Floors" should be substituted into the building sound insulation class under the JIS A 1419 "Method for Measurement of Sound Insulation of Buildings and Building Elements," to find L number. Alternatively, predictive methods such as "Building Sound Insulation Design Documents," (Architectural Institute of Japan, 1998) may also be used.

■Reference) Sound insulation classification for floor impact noise level (JIS A 1419)



● 1.2.4 Sound Insulation of Floor Slabs (heavy-weight impact source)

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Sch
Level 1	Worse than L-65
Level 2	L-65
Level 3	L-60
Level 4	L-55
Level 5	L-50 or better

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Worse than L-60
Level 2	L-60
Level 3	L-55
Level 4	L-50
Level 5	L-45 or better

☐ Commentary

Heavy impact noise is the kind of impact noise generated by children jumping. For this assessment, the L number may be calculated from measured values in the same way as for light impact noise, or predictive methods such as "Building Sound Insulation Design Documents," (Architectural Institute of Japan, 1998) may also be used.

Sound insulation performance for impact noise, both heavy and light, varies with slab type, slab thickness, flooring materials, end restraint conditions, and the area of the room receiving the noise, but the reference below presents guideline values for the sound insulation class against heavy impact (reference 1) and the amount of improvement in L number (reference 2) for each type of finish.

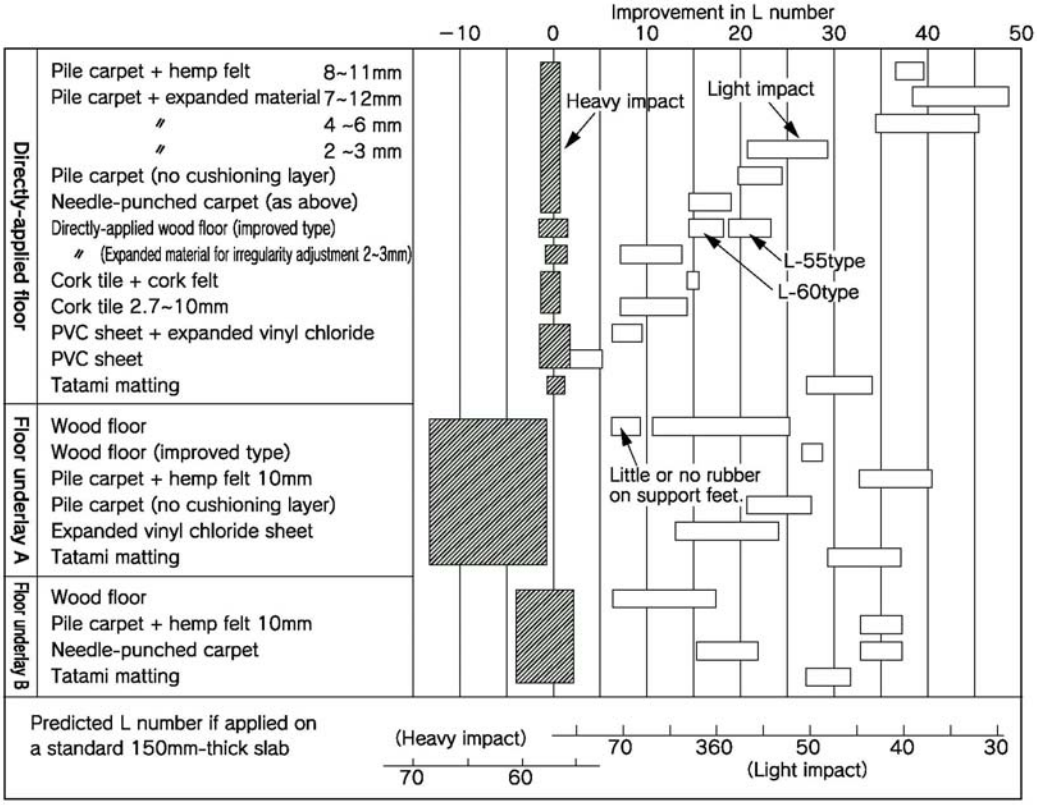
■Reference 1) Guideline figures for slab thickness, slab area sound insulation classification against heavy impact

Slab thickness (mm)	Slab area (m²)									
	12	15	20	25	30	35	40	45	50	60
120	L-55	L-60	L-60	L-65	L-65	L-65	—	—	—	—
130	L-55	L-55	L-60	L-60	L-65	L-65	L-65	—	—	—
140	L-50	L-55	L-55	L-60	L60-	L-65	L-65	L-65	—	—
150	L-50	L-55	L-55	L-60	L-60	L-60	L-60	L-65	L-65	L-65
160	L-50	L-50	L-55	L-55	L-60	L-60	L-60	L-60	L-65	L-65
180	L-45	L-50	L-50	L-55	L-55	L-60	L-60	L-60	L-60	L-60
200	L-45	L-45	L-50	L-50	L-55	L-55	L-55	L-60	L-60	L-60
230	—	L-45	L-45	L-50	L-50	L-55	L-55	L-55	L-60	L-60
250	—	—	L-45	L-50	L-50	L-50	L-55	L-55	L-55	L-60

NOTE) Ordinary concrete slab, 4 large supporting beams, span ratio: approx. 1.0 to 1.5

■Bibliography 41), 44)

■Reference 2) Improvement in L number for each type of finish



■Bibliography 44）

● 1.3 Sound Absorption

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hsp・Htl・Apt・Fct
Level 1	Sound absorbent materials are not used.
Level 2	
Level 3	Sound absorbent materials are in either the walls, floor or ceiling.
Level 4	
Level 5	Sound absorbent materials are in the walls, floor and ceiling.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Sound absorbent materials are not used.
Level 2	
Level 3	Sound absorbent materials are in either the walls, floor or ceiling.
Level 4	
Level 5	Sound absorbent materials are in the walls, floor and ceiling.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate the ease of absorption of noise by interior materials.

Raising the average sound absorption rate attenuates noise entering the interior or generated within it, thereby reducing noise levels. The average sound absorption of the finishes in a room is found from absorption rates, but this assessment simply evaluates whether materials for that purpose are used in the floor, walls and ceiling.

■Bibliography 45)

● 2. Thermal Comfort

● 2.1 Room Temperature Control

● 2.1.1 Room Temperature Setting

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hsp・Htl・Apt・Fct
Level 1	The minimum equipment capacity is provided to achieve temperatures of 20˚C in winter and 28˚C in summer, which require tolerance of some discomfort
Level 2	
Level 3	Equipment capacity is provided to achieve temperatures of 22˚C in winter and 26˚C in summer, which are ordinary settings.
Level 4	
Level 5	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.
Building type	Sch
Level 1	The minimum equipment capacity is provided to achieve temperatures of 10˚C or more in winter and less than 30˚C in summer, which require tolerance of some discomfort
Level 2	
Level 3	Equipment capacity is provided to achieve temperatures of 18~20˚C in winter and 25~28˚C in summer, which are ordinary settings.
Level 4	
Level 5	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.
Building type	Rtl・Rst・Hal
Level 1	The minimum equipment capacity is provided to achieve temperatures of 18˚C in winter and 28˚C in summer, which require tolerance of some discomfort
Level 2	
Level 3	Equipment capacity is provided to achieve temperatures of 20˚C in winter and 26˚C in summer, which are ordinary settings.
Level 4	
Level 5	Equipment capacity is provided to achieve temperatures of 22˚C in winter and 24˚C in summer.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Residential and Accommodation Sections	
Building type	Hsp･Htl
Level 1	The minimum equipment capacity is provided to achieve temperatures of 20˚C in winter and 28˚C in summer, which require tolerance of some discomfort
Level 2	
Level 3	Equipment capacity is provided to achieve temperatures of 22˚C in winter and 26˚C in summer, which are ordinary settings.
Level 4	
Level 5	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.
Building type	Apt
Level 1	The minimum equipment capacity is provided to achieve temperatures of 18˚C in winter and 28˚C in summer, which require tolerance of some discomfort
Level 2	
Level 3	Equipment capacity is provided to achieve temperatures of 22˚C in winter and 26˚C in summer, which are ordinary settings.
Level 4	
Level 5	Equipment capacity is provided to achieve temperatures of 24˚C in winter and 24˚C in summer.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

□ Commentary

Evaluate the capacity of equipment provided for realizing the set indoor temperature.

Level settings are based on the following sources.

Level 1: Legally stipulated level. For school, based on New School Sanitation Standards of the Ministry of Education, Culture, Sports, Science and Technology of Japan.

Level 3: Level for general society, or specification of Japanese Ministry of Land, Infrastructure and Transport. For school, based on table of School Sanitation Standards for metropolitan schools, or general recommended values.

Level 5:POEM-O (＊) optimum range: 22~24℃ in winter (20~22℃ in winter in stores, restaurants), 24~26℃ in summer.

*POEM-O is an acronym for Post-Occupancy Evaluation Method - Office, an indoor environment evaluation method developed for offices by the Indoor Environment Forum (a joint private-academic sector research group sponsored by the former Architecture Research Institute).

■Bibliography 2),3),4),5),6),7)

- 2.1.2 Variable Loads & Following-up Control

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Sch･Rtl･Rst･Hal
Level 1	No notable consideration has been given to sudden changes in loads.
Level 2	
Level 3	General load variations are considered, and the system affords some degree of control.
Level 4	

Level 5	The control system allows advanced following control of load variations.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate variable load following-up control used to realize room temperature setting values.
Schools, stores and similar buildings have large occupied room spaces, and experience wide variations of internal loads, such as occupants and lighting. Therefore, even if the equipment capacity is adequate, there is the risk of excessively long lags in the air conditioning system. If room temperature control cannot keep up with variable loads, the room temperature will fluctuate. Level settings are expected to be based on the ideas below.

Level 1: On/ Off control.
Level 3: PID control (PI control, PD control)
Level 5: Occupancy (load) prediction, scheduled changes in temperature setting, and scheduled switching of the heat source off and on.

● 2.1.3 Perimeter Performance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	No attention has been paid to the infiltration of heat through window systems , outside walls, roof and floor (particularly where piloti are used), and insulation performance is poor. (Window system SC: around 0.7, U=6.0W/(m^2K), outer walls and others: U=3.0"/(m^2 K))
Level 2	
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and there is no practical problem with insolation blocking and insulation performance. (Window system SC: around 0.5, U=4.0W/(m^2 K), outer walls and others: U=2.0W/(m^2 K))
Level 4	
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows systems, outside walls, roof and floor (particularly where piloti are used), and the building has the highest level of insolation blocking and insulation performance. (Window system SC: around 0.2, U=3.0W/(m^2 K), outer walls and others: U=1.0W/(m^2 K))

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	No attention has been paid to the infiltration of heat through window systems , outside walls, roof and floor (particularly where piloti are used), and insulation performance is poor. (Window system SC: around 0.7, U=6.0W/(m^2 K), outer walls and others: U=3.0"/(m^2 K))
Level 2	
Level 3	Attention has been paid to the infiltration of heat to the interior through windows, outside walls, roof and floor (particularly where piloti are used), and there is no practical problem with insolation blocking and insulation performance. (Window system SC: around 0.5, U=4.0W/(m^2 K), outer walls and others: U=2.0W/(m^2 K))
Level 4	
Level 5	Close attention has been paid to the infiltration of heat to the interior through windows systems, outside walls, roof and floor (particularly where piloti are used), and the building has the highest level of insolation blocking and insulation performance. (Window system SC: around 0.2, U=3.0W/(m^2 K), outer walls and others: U=1.0W/(m^2 K))

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Building type	Apt					
	Thermal transmission loss coefficient Q (units W/m^2 -k)					
	Zone I	Zone II	Zone III	Zone IV	Zone V	Zone VI
Level 1	2.8＜Q	4.0＜Q	4.4＜Q	4.9＜Q	7.1＜Q	7.1＜Q
Level 2	-	-	-	-	-	-
Level 3	1.8＜Q≦2.8	2.7＜Q≦4.0	3.1＜Q≦4.4	3.6＜Q≦4.9	3.9＜Q≦7.1	6.2＜Q≦7.1
Level 4	1.6＜ ≦1.8	1.9＜ ≦2.7	2.4＜Q≦3.1	2.7＜Q≦3.6	2.7＜Q≦3.9	3.7＜Q≦6.2
Level 5	Q≦1.6	Q≦1.9	Q≦2.4	Q≦2.7	Q≦2.7	Q≦3.7

NOTE) I –VI represent regional categories correspond to those used in the “Standard for judgement by Owner Regarding the Rational Use of Energy Relating for Housing.”

□ Commentary

Evaluate ability to block thermal infiltration from the surroundings.

Evaluate whether window systems and exterior walls have been selected to exclude outside disturbances as far as possible, in order to maintain room temperature. Even with inferior perimeter performance, it is possible to meet the temperature setting at the thermostat position, provided the temperature setting is not unreasonable and the equipment has sufficient capacity, but if there are windows and walls that have extremely low or high surface temperatures, there will be inconsistencies in temperature within the room. Vertical temperature difference and radiation from exterior walls and windows will cause localized discomfort to occupants.

■Reference 1) Consideration of regional differences

- Window performance: Peak insolation varies by time and season, but there is little regional difference, so shading coefficient (SC) can be used for assessment without consideration of regional differences.
- Outer wall performance: As values to indicate the impact of thermal loads on the interior, there is effective temperature difference in summer and room interior-exterior temperature difference in winter, but effective temperature difference depends on insolation and outer wall insulation performance, which means it is independent of regional differences. The room interior-exterior temperature difference in winter is influenced by differences in design outside air conditions, so it should be evaluated as below.

The scoring criteria consider the allowable values for uneven radiation and vertical temperature difference, which are assessment items for the interior environment, with the temperature differences from the interior set temperature and the interior surface temperature of the outer wall substituted as judgement standards. There are three levels of temperature difference Δt, being level 5 (Δt≦3℃), level 3 (Δt≦6℃) and level 1 (Δt>6℃). It is calculated from the overall heat transfer coefficient U, interior temperature setting Tr, and winter design outdoor air temperature To for the region, in order to determine the level.

Temperature difference Δt[℃]= (U／αi)x(Tr -To) αi: interior heat transfer coefficient (around 9W/m^{2}K).

The perimeter normally comprises outer wall and window glass, so the level should be determined with reference to the transfer coefficients and the ratio of areas between wall and window.

The content of the table is based on the assumption of a typical combination of 24℃ as the indoor temperature setting and outside air temperature of 0℃.

This follows the thermal transmission loss coefficient (Q value) for “Apartments” under the 1999 standards(next generation energy saving standards).

■Reference 2) Commentary on perimeter performance

Heat penetration from the outside must be minimized in order to maintain a comfortable internal environment. The overall heat transfer coefficient U, which represents the level of heat flow for a given temperature difference, and shading coefficient SC, which represents the entry of sunlight to the interior, are of reference as indicators for perimeter performance. The smaller the values of overall heat transfer coefficient U and shading coefficient SC, the better the entry of heat is being suppressed.

(1) Overall heat transfer coefficient U

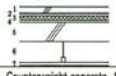
Example values of overall heat transfer coefficient for exterior walls, roofs, floors and other elements are presented in next page.

(Quoted from “Standards and Procedures for Building Equipment Design” (partially modified), Japanese Ministry of Land, Infrastructure and Transport)

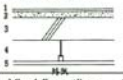
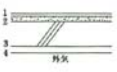
Examples of heat transfer coefficient U for walls

No.	Exterior wall	Material	t (mm)	U W/m²℃ Thickness of RC 150	U W/m²℃ Thickness of RC 180
1		1. Additional concrete 2. RC 3. Mortar (Same for multi-layer patterned spraying)	20 20	3.5	3.3
2		1.Additional concrete 2. RC 4. Air layer 5. Gypsum board (Same for multi-layer patterned spraying)	20 12	2.4	2.3
		3. Polystyrene foam	25 30	0.93 0.81	0.93 0.81
3		1. Additional concrete 2. RC 4. Air layer 5. Gypsum board (Same for multi-layer patterned spraying)	20 12×2	2.09	1.97
		3. Polystyrene foam	25 30	0.93 0.81	0.93 0.81

Examples of heat transfer coefficient U for roof

No.	Roof structure	Ceiling material	t(mm)	U W/m²℃
1	1. Counterweight concrete 80 2. Asphalt 5 3. Polystyrene foam 25 4. Asphalt 5 5. RC 130 6. Air layer 7. Ceiling material 	Gypsum board	9	0.8
		Gypsum board Rockwool acoustic board	9 9	0.7
		Gypsum board Rockwool acoustic board	9 12	0.7
2	1. Counterweight concrete 80 2. Asphalt 5 3. Polystyrene foam 50 4. Asphalt 5 5. RC 130 6. Air layer 7. Ceiling material 	Gypsum board	9	0.8
		Gypsum board Rockwool acoustic board	9 9	0.5
		Gypsum board Rockwool acoustic board	9 12	57

Examples of heat transfer coefficient U for floors

No.	Floor structurel	Ceiling material	t(mm)	U W/m²℃
1	1. Vinyl floor tiles 3 2. Mortar 27 3. RC 120 4. Air layer 5. Ceiling material 	Aluminum sheet	0.8	0.8
		Steel sheet	0.4	2.9
2	1. Vinyl floor tiles 3 2. Mortar 27 3. RC 120 4. Ceiling material 	Rockwool spraying	10	2.0
			15	1.6
		Polystyrene foam	15	1.5
			20	1.8
			25	1.1
			30	0.9
			50	0.8

t=thickness

(2) Shading coefficient SC and heat transfer coefficient U for window systems

These are approximate values of shading coefficient and heat transfer coefficient, based on differences in the glass used.

3m/m glass

: Shading coefficient SC=1.0, heat transfer coefficient around 6.0W/(m^2K)

Transparent multi-pane glass, High-performance single-pane glass

:Shading coefficient SC=0.8~0.6, heat transfer coefficient around 4.0~5.0W/(m^2K)

High-performance multi-pane glass

:Shading coefficient SC=0.5, heat transfer coefficient around 3.0W/(m^2K).

■Bibliography 2),3),4),5),6),7),46), 47)

The use of internal blinds, air barriers, airflow windows, double skins and other window systems should not be evaluated for their individual performance, but rather for the combined shading coefficient and heat transfer coefficient of the systems they form.

● 2.1.4 Zoned Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hsp・Htl・Fct
Level 1	No distinction is made between orientation directions, or between perimeter and interior, and only one air conditioning system is planned, which must be switched between heating and cooling.
Level 2	
Level 3	There is air conditioning zoning that differentiates between orientation directions, and between perimeter and interior. The air conditioning system can provide either heating or cooling separately to each zone.
Level 4	
Level 5	There are separate air conditioning systems for each orientation direction, and for perimeter and interior, allowing more detailed zoning (broadly, zones of 40m^2 or less). The air conditioning system can provide either heating or cooling separately to each zone.
Building type	Rtl・Rst・Hal
Level 1	There is no zoning of heating and cooling within a single floor, and a single-circuit air conditioning system is planned. Switching between heating and cooling is required for the selection of air conditioning modes.
Level 2	
Level 3	Each floor is divided into multiple zones according to their thermal loads, and the air conditioning system is planned to allow either heating or cooling in each zone.
Level 4	
Level 5	Each floor is divided into many small zones for individual sales areas or tenants, and the air conditioning system is planned to allow either heating or cooling in zone units.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
In case where airflow windows are used to make the space perimeterless, or in small offices with little depth, the first half of the description, concerning the distinction between perimeter and interior, may be ignored.

☐ Commentary

Evaluate whether a finely-zoned air conditioning system is used to eliminate temperature variations, and create a comfortable environment in the interior

● 2.1.5 Temperature & Humidity Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On/Off control of temperature and humidity.
Level 2	
Level 3	Fixed-setting control of interior temperature and humidity settings.
Level 4	
Level 5	Comfort sensors etc. can be used to control temperature and humidity (temperature control within the comfort range).

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Residential and Accommodation Sections	
Building type	Hsp･Htl
Level 1	On/Off control of temperature and humidity.
Level 2	
Level 3	Fixed-setting control of interior temperature and humidity settings.
Level 4	
Level 5	Comfort sensors etc. can be used to control temperature and humidity (temperature control within the comfort range).

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate the grade of temperature and humidity control. Evaluate whether consideration has been given to a control system able to create an environment with little fluctuation in temperature and humidity and no discomfort.

● 2.1.6 Individual Control

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties - Inapplicable

Residential and Accommodation Sections	
Building type	Hsp･Htl
Level 1	Nothing.
Level 2	
Level 3	Switchable between low, middle and high.
Level 4	
Level 5	Any room can be either heated or cooled, and the temperature can be set for each individual room.
Building type	Apt
Level 1	No consideration given.
Level 2	
Level 3	Temperature can be set for each individual room.
Level 4	
Level 5	The temperature for the whole dwelling can be set, and further settings can be made for each individual room.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate whether the occupants of each room can set room temperature to their preference.

Buildings with large numbers of occupants, such as office buildings, should not be evaluated by representative temperature and humidity settings. Instead, evaluate whether detailed, personal-level settings can be made for each occupant, or for small numbers of occupants.

- 2.1.7 Allowance for After-hours Air Conditioning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Fct
Level 1	Air conditioning does not operate after hours, or on holidays.
Level 2	
Level 3	The air conditioning system can operate for any whole floor that is occupied after hours and on holidays.
Level 4	
Level 5	The air conditioning system can operate for any zone that is occupied after hours and on holidays.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate how air conditioning after hours is handled. Even if the start time for air conditioning is the same for a whole building, it must be rare for all air conditioning needs to stop simultaneously. Air conditioning should be able to provide a comfortable environment for those in the building after hours.

- 2.1.8 Monitoring Systems

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Rtl・Rst
Level 1	There is no multiple zoning for separate loads on the same floor, but sensors or other monitoring systems are installed for monitoring a representative zone.
Level 2	
Level 3	There is multiple zoning for separate loads on the same floor, and sensors or other monitoring systems are installed for monitoring multiple zones.
Level 4	
Level 5	Each floor is zoned in detail for sales areas and tenants, and sensors or other monitoring systems are installed for monitoring those zones in detail.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

☐ Commentary

Evaluate whether there are detailed monitoring systems for maintenance and management purposes. There are many zones with different load characteristics and building types, such as stores and restaurants, in a mix of sales areas on each floor. Monitoring systems are needed that can tell the temperature in each zone and control it closely.

● 2.2 Humidity Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Rtl・Rst・Hal・Hsp・Htl・Apt
Level 1	Equipment capacity is sufficient to keep humidity to 70% in summer and 40% in winter.
Level 2	
Level 3	Humidification equipment is available, and equipment capacity is generally sufficient to keep humidity to 50% in summer and 40% in winter.
Level 4	
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity to 50% in summer and 50% in winter.
Building type	Sch
Level 1	Equipment capacity is sufficient to keep humidity to 80% or below in summer and 30% or above in winter.
Level 2	
Level 3	Humidification equipment is available, and equipment capacity is generally sufficient to keep humidity to 40~70% in winter and 50~65% in summer.
Level 4	
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity to 50% in summer and 50% in winter.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Equipment capacity is sufficient to keep humidity to 70% in summer and 40% in winter.
Level 2	
Level 3	Humidification equipment is available, and equipment capacity is generally sufficient to keep humidity to 50% in summer and 40% in winter.
Level 4	
Level 5	Humidification and dehumidification equipment is available, and equipment capacity is sufficient to keep humidity to 50% in summer and 50% in winter.
Building type	Apt
Level 1	No consideration given.
Level 2	(Inapplicable)
Level 3	Appropriate ventilation functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.
Level 4	Dehumidification functions are provided, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.
Level 5	Dehumidification and humidification functions are provided and set to a comfort range of 45~55%, and anti-condensation measures have been taken on elements that can act as heat bridges, such as insulation reinforcement, moisture barriers and permeable layers.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).

□ Commentary
Evaluate according to the set target value for humidity. Dehumidification and humidity control intended to provide comfort in summer, and humidification for health reasons in winter are regarded as important services.
In winter it will be relieved somewhat from the maximum level. Assuming dehumidification using cooling coil for summer and humidification using humidifier for winter are provided through general air conditioning equipment. Level settings are based on the following sources.
Level 1: Satisfy 40~70% of the Law for Maintenance of Sanitation in Buildings (Building Sanitation Law), based on “Sanitation Management Standards for Buildings” of the Ministry of Education, Culture, Sports, Science and Technology of Japan.
Level 3: Level for general society, or specification of Japanese Ministry of Land, Infrastructure and Transport. For “Schools,” based on table of School Sanitation Standards for metropolitan schools, or general recommended values.
Level 5: POEM-O comfort zone: 45~55%.

■Bibliography 2),3),4),5),6),7), 47)

● 2.3 Type of Air Conditioning System Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature difference and air speed in the room.
Level 2	
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature difference and air speed in the room. Targets for vertical temperature difference and air speed are set to within 5˚C and 0.35m/s, respectively.
Level 4	
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature difference and air speed in the room. Targets for vertical temperature difference and air speed are set to within 2˚C and 0.15m/s, respectively.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*This refers to, for example, ceiling and floor radiant and cooling systems, or floor-vented system etc.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	The air conditioning system was planned with no particular consideration for the vertical temperature difference and air speed in the room.
Level 2	
Level 3	The air conditioning system is normal, but the air supply and extraction plan considered the vertical temperature difference and air speed in the room. Targets for vertical temperature difference and air speed are set to within 5˚C and 0.5m/s, respectively.
Level 4	
Level 5	The air conditioning system* was chosen to mitigate the vertical temperature difference and air speed in the room. Targets for vertical temperature difference and air speed are set to within 2˚C and 0.15m/s, respectively.

Building type	Apt
Level 1	The air conditioning system was chosen with no particular consideration for the vertical temperature difference and air speed in air-conditioned rooms, or for temperature differences between air-conditioned and non-air-conditioned rooms.
Level 2	
Level 3	Targets for vertical temperature difference and air speed within rooms are set to within 4˚C and 0.4m/s, respectively. Spot air conditioning is available even in non-air-conditioned areas such as toilets and bathrooms, mitigating temperature differences between rooms.
Level 4	
Level 5	Targets for vertical temperature difference and air speed within rooms are set to within 2˚C and 0.2m/s, respectively. Air conditioning is available in all rooms, including rooms such as toilets and bathrooms, making it possible to eliminate temperature differences between rooms.

NOTE) When it is difficult to decide, choose an intermediate level (level 2 or 4).
*This refers to, for example, ceiling and floor radiant and cooling systems, or floor-vented system etc.
☐ Commentary
Refer to Preliminary Design Stage Q-1 ●2.3

■Bibliography 2),3),4),5),7)

● 3 Lighting & Illumination

● 3.1 Daylighting

● 3.1.1 Daylight Factor

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Apt・Fct
Level 1	Less than 1.0%
Level 2	1.0% or more, less than 1.5%
Level 3	1.5% or more, less than 2.0%
Level 4	2.0% or more, less than 2.5%
Level 5	2.5% or more

Residential and Accommodation Sections		
Building type	Hsp	Htl・Apt
Level 1	Less than 0.5%	Less than 0.5%
Level 2	0.5% or more, less than 0.75%	0.5%or more, less than 1.0%
Level 3	0.75% or more, less than 1.0%	1.0% or more, less than 1.5%
Level 4	1.0% or more, less than 1.25%	1.5% or more, less than 2.0%
Level 5	1.25% or more	2.0% or more

☐ Commentary
Evaluate according to the daylight factor.
Refer to Preliminary Design Stage Q-1 ●3.1.1.

● 3.1.2 Openings by Orientation

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties - Inapplicable

Residential and Accommodation Sections	
Building type	Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No south-facing windows.
Level 4	South-facing windows.
Level 5	South and east-facing windows.

☐ Commentary

Evaluate whether the positions (orientations) of openings make efficient use of daylight.
For a dwelling with the most common room layout on the standard floor, make a total assessment of the one dwelling. The Housing Performance Indication System calculates numerical opening ratios in each direction, but for this evaluation it will be sufficient to say whether there are openings in each direction.

● 3.1.3 Daylight Devices

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There are no daylight devices.
Level 4	There is one type of daylight device.
Level 5	There are two or more types of daylight device, or they have advanced functions.
Building type	Rtl・Rst・Hsp・Htl・Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There are no daylight devices.
Level 4	(Inapplicable)
Level 5	There are some daylight devices.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There are no daylight devices.
Level 4	(Inapplicable)
Level 5	There are some daylight devices.

☐ Commentary

Refer to Preliminary Design Stage Q-1 ●3.1.3.

● 3.2 Anti-glare Measures

● 3.2.1 Glare from Light Fixtures

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hsp・Htl・Apt・Fct
Level 1	G3, V3
Level 2	(Inapplicable)
Level 3	G2, V2
Level 4	(Inapplicable)
Level 5	G1, G0, V1
Building type	Sch
Level 1	No anti-glare measures
Level 2	(Inapplicable)
Level 3	G3
Level 4	G2
Level 5	G1, G0, V1

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	G2, V2
Level 2	(Inapplicable)
Level 3	G, V1
Level 4	(Inapplicable)
Level 5	G0

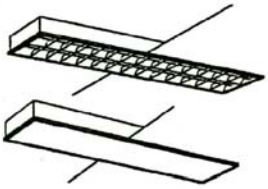
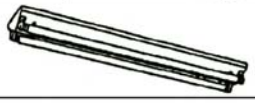
☐ Commentary

Evaluate with reference to the fluorescent lamp glare classifications contained in the Technical Guidelines for Office Illumination JIIEG-001 (Illumination Engineering Institute of Japan, 1992).

Evaluate the level of control of light fixtures to avoid glare for occupants. The reference below presents

examples of the glare classifications of typical fluorescent light fixtures

■Reference) Glare classifications (Fluorescent light fixtures)

Class	Explanation	Example
GO (V1) (V2) (V3)	Fluorescent light fixtures such as mirrored louvers are used to strictly control glare.	
Gla	Fluorescent light fixtures such as omnidirectional white louver (1), diffusion panels or prismatic panels are used to thoroughly control glare.	
Glb	Fluorescent light fixtures such as omnidirectional white louvers (1) are used to control glare.	
G2	Fluorescent light fixtures limit glare by blocking horizontal line of sight to the lamp.	
G3	Fluorescent light fixtures which leave the lamp exposed and do not attempt to reduce glare.	

(1) Fluorescent light fixture shaded with white louvers in the A-A and B-B cross sectional directions.
(2) Fluorescent light fixture shaded with white louvers in the A-A cross sectional direction only.

■Bibliography 48), 49)

● 3.2.2 Daylight Control

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Apt・Fct
Level 1	Nothing.
Level 2	(Inapplicable)
Level 3	Controlled by blinds.
Level 4	(Inapplicable)
Level 5	Controlled by eaves and blinds.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Glare when facing south on a clear day.
Level 2	(Inapplicable)
Level 3	Slight glare when facing south on a clear day.
Level 4	(Inapplicable)
Level 5	No glare, even facing south on a clear day.

☐ Commentary

Evaluate anti-glare measures from direct sunlight according to whether there are curtains and eaves around the openings. The state and degree of glare should be considered for the hours of direct insolation, while the space concerned is occupied, used for work or otherwise in use. The assessment improves with the number of functions for blocking direct sunlight

● 3.3 Illuminance Level

● 3.3.1 Illuminance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hsp・Htl・Apt・Fct
Level 1	Less than 500lx or less
Level 2	500lx or more, less than 600lx
Level 3	600lx or more, less than 750lx, or 1,500lx or more
Level 4	750lx or more, less than 1,000lx
Level 5	1,000lx or more, less than 1,500lx
Building type	Sch
Level 1	Less than 400lx
Level 2	400lx or more, less than 500lx
Level 3	500lx or more, less than 600lx, or 1,000lx or more
Level 4	600lx or more, less than 750lx
Level 5	750lx or more, less than 1,000lx

Residential and Accommodation Sections		
Building type	Hsp	Htl・Apt
Level 1	Less than 150lx	Less than 100lx
Level 2	(Inapplicable)	(Inapplicable)
Level 3	150lx or more	100lx or more
Level 4	(Inapplicable)	(Inapplicable)
Level 5	(Inapplicable)	(Inapplicable)

☐ Commentary

Evaluate the brightness of a desktop (80cm above the floor) in the center of the room in daytime in terms of

illuminance level (in lux).
1,500lx or more (1,000lx or more in “Schools”) is too bright and will result in a lower assessment. If the hours of usage of “Schools” etc. are limited to daylight hours, the brightness used should take into account the minimum level of daylight.

■Bibliography 10),11)

● 3.3.2 Uniformity Ratio of Illuminance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Hsp・Htl・Apt・Fct
Level 1	Overall lighting may leave very dark areas in the interior, which can feel uncomfortable.
Level 2	Overall lighting may leave dark areas in the interior, which can feel slightly uncomfortable.
Level 3	Overall lighting may leave dark areas in the interior to an acceptable degree. With task/ambient lighting, the balance between work surface brightness and surrounding brightness is inadequate.
Level 4	With overall lighting, there are almost no dark areas in the interior.
Level 5	With overall lighting, there are no dark areas in the interior. With task/ambient lighting, the balance between work surface brightness and surrounding brightness is good.

Residential and Accommodation Sections	
Building type	Hsp
Level 1	Overall lighting may leave very dark areas in the interior, which can feel uncomfortable.
Level 2	Overall lighting may leave dark areas in the interior, which can feel slightly uncomfortable.
Level 3	Overall lighting may leave dark areas in the interior to an acceptable degree. With task/ambient lighting, the balance between work surface brightness and surrounding brightness is inadequate.
Level 4	With overall lighting, there are almost no dark areas in the interior.
Level 5	With overall lighting, there are no dark areas in the interior. With task/ambient lighting, the balance between work surface brightness and surrounding brightness is good.

□ Commentary
Qualitatively evaluate the balance of light and dark produced in the space by the lighting method.

■Bibliography 10)

● 3.4 Lighting Controllability

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Hsp・Htl・Apt・Fct
Level 1	Control is not zoned and lighting cannot be adjusted from a control panel, from the fixtures or elsewhere.
Level 2	(Inapplicable)
Level 3	Control is possible in units of 4 working areas. Lighting can be adjusted from a control panel, from the fixtures or elsewhere, and any of the conditions is met.
Level 4	(Inapplicable)
Level 5	Control is possible in units of 1 working area, and adjustment is possible from control terminals, remote controls or similar means.

Residential and Accommodation Sections	
Building type	Hsp
Level 1	No lighting control is possible.
Level 2	(Inapplicable)
Level 3	Controllable in units of several beds. Lighting can be adjusted from a control panel, from the fixtures or elsewhere, and any of the conditions is met.
Level 4	(Inapplicable)
Level 5	Detailed lighting control is possible for individual bed units.
Building type	Htl・Apt
Level 1	No lighting control is possible.
Level 2	(Inapplicable)
Level 3	There is a lighting control panel, device etc. for broadly controlling overall lighting in the room.
Level 4	(Inapplicable)
Level 5	There are terminals, remote control units or other means for detailed control of lighting in several areas of the interior.

☐ Commentary

Evaluate the smallest possible range of lighting control in the subject space.

Lighting controllability refers to the level of control which the room occupant can personally exercise by switching lights on and off and adjusting their brightness and positions. The more detailed the control, the higher the level. “Working units” and “multiple portions within the room” in an office, for example, would refer to one span in the building if it is not clear whether the working unit is a row of desks or a single desk. In houses and residential buildings, control refers to the ability to illuminate areas as required by the positions and movements of occupants. Level 1 for hospitals etc. means that lights can only be turned on and off or adjusted for whole blocks, even though partial lighting is required.

● 4 Air Quality

It is clearly important to maintain healthy indoor air in rooms, but achieving that aim requires careful consideration of aspects such as materials selection, ventilation and construction methods. The level of such consideration is evaluated here.

The basic approach to maintaining healthy indoor air in rooms is simple in itself, namely to first avoid the emission of pollutants as far as possible, and then to use ventilation to expel those pollutants which have been emitted. This approach is combined with operation and management aspects and divided into three items (source control, ventilation and operation plan) for assessment.

● 4.1 Source Control

Cutting off pollutants at source is a sure and effective way of maintaining healthy indoor air. Thus, the first consideration is to minimize the emission of pollutants from the building and its equipment. In that sense, source control are more important than ventilation and operation plan.
Among the potential pollutants, chemical pollutants have attracted the most attention in recent years, but for the purpose of maintaining healthy indoor air, the same level of consideration must be given to measures against mineral fiber, mites, mold, legionella bacilli, cigarette smoke and other pollutants.

● 4.1.1 Chemical Pollutants

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Satisfies the Building Standards Law.
Level 4	Satisfies the Building Standards Law, and nearly all materials used (at least 70% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS standard F☆☆☆☆).
Level 5	Satisfies the Building Standards Law, and nearly all materials used (at least 90% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS standard F☆☆☆☆). Furthermore, construction materials used throughout have low emission levels of VOCs other than formaldehyde.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Satisfies the Building Standards Law.
Level 4	Satisfies the Building Standards Law, and nearly all materials used (at least 70% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS standard F☆☆☆☆).
Level 5	Satisfies the Building Standards Law, and nearly all materials used (at least 90% by area of floors, walls and ceilings) are not subject to restriction under the Building Standards Law (JIS/ JAS standard F☆☆☆☆). Furthermore, construction materials used throughout have low emission levels of VOCs other than formaldehyde.

☐ Commentary

Evaluate whether adequate measures have been taken to avoid air pollution by chemical pollutants
Refer to Preliminary Design Stage Q-1 ●4.1.1.

● 4.1.2 Mineral Fibers

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	No exposure in the living room, or in any location from which mineral fibers could enter the living room. Some level of exposure elsewhere.
Level 4	(Inapplicable)
Level 5	Absolutely no exposed mineral fibers.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	No exposure in the living room, or in any location from which mineral fibers could enter the living room. Some level of exposure elsewhere.
Level 4	(Inapplicable)
Level 5	Absolutely no exposed mineral fibers.

☐ Commentary

Asbestos is carcinogenic, and interior use of asbestos-containing products must be avoided. Glass wool, rock wool and similar materials have longer fibers than asbestos, and they are believed to have less physiological impact, but the dispersion of fibrous substances must be avoided, at least in areas which will be occupied for extended periods by children and the elderly.

■Bibliography 50), 51)

● 4.1.3 Mites, Mold etc.

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The décor on at least 50% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.
Level 4	The décor on at least 65% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.
Level 5	The décor on at least 80% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.

Residential and Accommodation Sections	
Building type	Hsp･Htl･Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The décor on at least 50% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.
Level 4	The décor on at least 65% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.
Level 5	The décor on at least 80% of the area of floors and external walls has been designed to restrict the growth of mites and mold, or to facilitate cleaning and maintenance.

☐ Commentary

Mites and mold are allergens (substances that provoke allergies). Also, chemical agents are used to remove mites and mold when they grow, which could indirectly harm indoor air quality.

Evaluate the degree to which interior materials have been selected to restrict the growth of mold and mites, and to facilitate cleaning and maintenance. For example, for the sake of hygiene it is desirable to use wood floor or tiles wherever possible, as they allow complete removal of dust and waste through cleaning. If carpets are used, they should be short pile, allowing appropriate cleaning and maintenance to remove dead mites and dust. Tiles that can be removed for cleaning are better than wall-to-wall carpets. Materials that resist mites and mold are preferable to materials that rely on chemical treatment. Of course, thorough measures must also be taken against condensation, which is the root cause of mold.

■Bibliography 50), 51), 52), 53), 54)

● 4.1.4 Legionella

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Entire Building and Common Properties	
Building type	Off･Sch･Rtl･Rst･Hal･Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There is a minimum level of water processing in water cooling towers, and measures against dispersion, and a minimum level of measures for water heaters.
Level 4	There is no water cooling tower. However there is thorough water processing in water cooling towers, thorough measures against dispersion, and a minimum level of measures for water heaters.
Level 5	There is no water cooling tower. However there are water processing in water cooling towers, measures against dispersion and measures for water heaters are all thorough. There is also a good design for the maintenance of this equipment.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There is a mimimum level of measures for water processing in cooling towers, anti-dispersion and hot water supply.
Level 4	(Inapplicable)
Level 5	There is no water cooling tower. However there are water processing in water cooling towers, measures against dispersion and measures for water heaters are all thorough. There is also a good design for the maintenance of this equipment.

☐ Commentary

Infection with legionella bacteria causes symptoms resembling pneumonia. Death can result in cases of incorrect treatment. Water cooling towers and hot water tanks can easily become breeding grounds for legionella bacteria. From cooling towers, the bacteria could move to the building interior through outside air intakes. Water heater tanks can become breeding grounds if they stay at a low temperature.

Measures for water cooling towers and hot water tanks will be evaluated here. The minimum level of countermeasures for water cooling towers is chemical injection and automatic blowing to maintain water quality, with measures to prevent dispersion to the building's outside air intakes. Water heaters must maintain temperature of at least 55℃, even at peak times, to prevent legionella bacteria from reproducing. Level 5 requires special measures beyond the above, and thorough planning based on consideration of maintenance space, equipment storage etc. If there is no water cooling tower, thorough consideration given to water heaters is sufficient for level 5.

■Bibliography 50), 51)

● 4.2 Ventilation

The most effective method for maintaining healthy indoor air is to totally minimize the emission of pollutants from the building and its equipment, but in many cases that ideal must be balanced against cost and design considerations to permit some level of emission. In such cases, adequate ventilation can be planned to improve the air quality. Rather than conveniently relying on operation and management or automatic control, it is important to give careful consideration to the baseline quality of the outside air, the volume of outside air, zoning and other issues. It is also important to give the occupants some degree of scope for controlling their own ventilation.

● 4.2.1 Ventilation Rate

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	For rooms equipped with centrally-managed air mixing equipment, the adequate ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the minimum to satisfy the Building Standards Law.
Level 4	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.2 times that required minimum to satisfy the Building Standards Law.
Level 5	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.4 times that required minimum to satisfy the Building Standards Law.

Residential and Accommodation Sections

Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	For rooms equipped with centrally-managed air mixing equipment, the adequate ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the minimum to satisfy the Building Standards Law.
Level 4	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.2 times that required minimum to satisfy the Building Standards Law.
Level 5	For rooms equipped with centrally-managed air mixing equipment, the ventilation volume is based on the SHASE-102-1997 ventilation standard and commentary. If not, the volume is the 1.4 times that required minimum to satisfy the Building Standards Law.

☐ Commentary

Refer to Preliminary Design Stage Q-1 ●4.2.1.

● 4.2.2 Natural Ventilation Performance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There are no effective openings for natural ventilation in rooms where windows cannot be opened. Or, in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/20 the floor area of the room.
Level 4	In rooms with unopenable windows, the area of effective openings for natural ventilation is at least $50cm^2/m^2$ of floor area. Or, in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/15 the floor area of the room.
Level 5	In rooms with unopenable windows, the area of effective openings for natural ventilation is at least $100cm^2/m^2$ of floor area. Or, in rooms with openable windows, the area of effective openings for natural ventilation is at least 1/10 the floor area of the room.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	In a building with ventilation equipment, but no natural ventilation is available. In a building with no ventilation equipment, openable windows are available for at least 1/20 of the occupied floor area of residential and accommodation section.
Level 4	In a building with ventilation equipment, openable ventilation windows have been provided in residential and accommodation areas at a rate of at least 500cm^2/m^2 of occupied floor area. In a building with no ventilation equipment, openable windows are available for at least 1/15 of the occupied floor area of residential and accommodation section.
Level 5	In a building with ventilation equipment, openable ventilation windows have been provided in residential and accommodation areas at a rate of at least 100cm^2/m^2 of occupied floor area. In a building with no ventilation equipment, openable windows are available for at least 1/10 of the occupied floor area of residential and accommodation section.

Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Openable windows are available for at least 1/10 of the floor area of residential and accommodation sections.
Level 4	Openable windows are available for at least 1/8 of the floor area of residential and accommodation sections.
Level 5	Openable windows are available for at least 1/6 of the floor area of residential and accommodation sections.

☐ Commentary
Evaluate whether enough openable windows are provided.
Refer to Preliminary Design Stage Q-1 ●4.2.2.

● 4.2.3 Consideration of Outside Air Intake

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 3m away.
Level 4	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also positioned at least 6m away.
Level 5	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 6m away.

Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(Inapplicable)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 3m away.

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 3m away.
Level 4	(Inapplicable)
Level 5	Considering conditions in areas surrounding the site, the air intakes are oriented away from pollution sources and positioned to keep enough distance from extraction vents. They are also oriented away from extraction vents and positioned at least 6m away.
Building type	Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site.
Level 4	(Inapplicable)
Level 5	The air intakes are oriented away from pollution sources, considering conditions in areas surrounding the site. They are also oriented away from extraction vents and positioned at least 3m away.

☐ Commentary

Refer to Preliminary Design Stage Q-1 ●4.2.3.

● 4.2.4 Air Supply Planning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Outside air is mixed with return air in the air conditioning equipment and supplied to each room in a volume determined by the thermal load in that room, so the system does not guarantee delivery of an adequate volume of outside air to all rooms in all load conditions.
Level 4	(Inapplicable)
Level 5	Outside air is not mixed with return air, and is supplied directly to each room in the volume required for ventilation. Therefore, the system guarantees the necessary outside air, delivered to the places where it is needed, regardless of the load conditions in each room.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Outside air is mixed with return air in the air conditioning equipment and supplied to each room in a volume determined by the thermal load in that room.
Level 4	(Inapplicable)
Level 5	Outside air is not mixed with return air, and is supplied directly to each room in the volume required for ventilation.

☐ Commentary

In a central air conditioning system, outside air is usually mixed with return air in the air conditioning equipment and supplied to each room in a volume determined by the thermal load in that room. Therefore, the total volume of outside air required in all rooms connected to the air conditioning equipment may be provided, but there is still no guarantee that enough outside air will reach everywhere that it is actually needed. A system that treats outside air in a separate system and supplies it direct to the rooms, guarantees an adequate volume where needed.

■Bibliography 18),50)

● 4.3 Operation Plan

● 4.3.1 CO_2 Monitoring

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The system is based on manual monitoring.
Level 4	(Inapplicable)
Level 5	The system has constant central monitoring of CO_2 in air quality.

☐ Commentary
Evaluate whether CO_2 control etc. forms a control system able to keep healthy air quality at all times.
Refer to 1. Preliminary Design Stage Q-1 ●4.3.1.

● 4.3.2 Control of Smoking

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There is a minimum level of measures, such as smoking booths, to avoid exposing non-smokers to smoke.
Level 4	(Inapplicable)
Level 5	Smoking is confirmed to be prohibited in the entire building. Alternatively, there is an adequate level of measures, such as smoking booths, to avoid exposing non-smokers to smoke.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Evaluate measures to avoid exposing non-smokers to smoke, such as prohibition of smoking in the entire building or installation of smoking booths.
Refer to 1. Preliminary Design Stage Q-1 ● 4.3.2.

Q-2 Quality of Service

When evaluating “Hospitals,” “Hotels” and “Apartments” for Q-2, evaluate the Common Properties of each building (hospital outpatient waiting rooms, hotel lobbies, apartment entrance halls etc.). For private areas, (hospital bedrooms, hotel guest rooms, apartments), base the assessment on assessment of Residential and Accommodation Sections.

● 1. Service Ability

● 1.1 Functionality & Usability

● 1.1.1 Provision of Space & Storage

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Working space per person is at least $6m^2$.
Level 4	Working space per person is at least $9m^2$.
Level 5	Working space per person is at least $12m^2$.

☐ Commentary
NOTE) Working space refers to floor area allocated within the effective floor area of the office for ordinary

workers to go about their daily duties. It does not include common spaces such as canteens, medical rooms, conference rooms, meeting rooms, private executive offices, filing rooms, space for refreshment (see 1.2.2) and similar spaces. Therefore the working space includes meeting spaces (spaces for day-to-day discussions), OA equipment spaces, management spaces, circulation spaces etc.

Residential and Accommodation Sections	
Building type	Hsp
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Private rooms at least 8m^2/bed, multi-bed rooms at least 6m^2/bed.
Level 4	(Inapplicable)
Level 5	Private rooms at least 10m^2/bed, multi-bed rooms at least 8m^2/bed.
Building type	Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Single room at least 15m^2, twin room at least 22m^2.
Level 4	Single room at least 22m^2, twin room at least 32m^2.
Level 5	Single room at least 30m^2, twin room at least 40m^2.

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●1.1.1.

● 1.1.2 Adaptation of Building Structure & Services to IT Innovation

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 30VA/m^2 socket capacity.
Level 4	Measures such as OA floors accommodate layout changes, and electrical sockets for OA equipment have at least 40VA/m^2 socket capacity.
Level 5	In addition to OA floors, measures such as prewiring are used to facilitate layout changes. Also, electrical sockets for OA equipment have at least 50VA/m^2 socket capacity.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●1.1.2.

● 1.1.3 Barrier-free Planning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Rtl・Rst・Hal・Hsp・Htl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The building satisfies the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 4	The building satisfies the incentive standard for barrier-free (the preferred level) under the Barrier-free Building Law.
Level 5	The building exceeds the incentive standard for barrier-free (the preferred level) under the Barrier-free Building Law, achieving the universal design level.
Building type	Off・Sch・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The building satisfies at least half of the items of the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 4	The building satisfies the standard for barrier-free (the minimum level) under the Barrier-free Building Law.
Level 5	The building satisfies the standard for barrier-free (the preferred level) under the Barrier-free Building Law.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●1.1.3.

● 1.2 Amenity

● 1.2.1 Perceived Spaciousness & Access to View

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	The ceiling height is at least 2.5m in offices, and the windows are placed to give all workers an adequate awareness of the outside.
Level 4	The ceiling height is at least 2.7m in offices, and the windows are placed to give all workers an adequate awareness of the outside.
Level 5	The ceiling height is at least 2.9m in offices, and the windows are placed to give all workers an adequate awareness of the outside.
Building type	Sch
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Classroom ceiling height is at least 3m.
Level 4	Classroom ceiling height is at least 3.1m.
Level 5	Classroom ceiling height is at least 3.2m.
Building type	Rtl・Rst
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Sales area ceiling height is at least 3m.
Level 4	Sales area ceiling height is at least 3.3m.
Level 5	Sales area ceiling height is at least 3.6m.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Guest room ceiling height is at least 2.3m.
Level 4	Guest room ceiling height is at least 2.5m.
Level 5	Guest room ceiling height is at least 2.7m.

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●1.2.1.

● 1.2.2 Space for Refreshment

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Smoking areas are provided.
Level 4	Refreshment space is provided that is separate from smoking areas.
Level 5	Refreshment space is provided that is separate from smoking areas, and it is equipped with beverage vending machines and similar equipment.
Building type	Rtl
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	Rest space is at least 2% of the sales floor area.
Level 4	Rest space is at least 3% of the sales floor area.
Level 5	Rest space is at least 4% of the sales floor area.

NOTE) When refreshment space is divided from working space by partitions, plants or other elements, it must be excluded from the working space floor area evaluated in 1.1.1.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Evaluate whether space for refreshment is provided that is separate from smoking areas, and it is equipped with beverage vending machines and similar equipment. Level 3 can be awarded if building-wide prohibition of smoking is assumed for offices

Refer to Preliminary Design Stage Q-2 ●1.2.2.

● 1.2.3 Décor Planning

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There has been some degree of interior décor planning, such as color planning of wallpaper and carpets.
Level 4	(Inapplicable)
Level 5	There has been careful interior décor planning, such as color planning of wallpaper and carpets.

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Not adequate for level 3.
Level 2	(Inapplicable)
Level 3	There has been some degree of interior décor planning, such as color planning of wallpaper and carpets.
Level 4	(Inapplicable)
Level 5	There has been careful interior décor planning, such as color planning of wallpaper and carpets.

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●1.2.3.

● 2. Durability & Reliability

● 2.1 Earthquake-resistance

● 2.1.1 Earthquake Resistance

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The building's earthquake resistance meets the requirements of the Building Standards Law.
Level 4	The building's earthquake resistance exceeds the requirements of the Building Standards Law by a 20% margin.
Level 5	The building's earthquake resistance exceeds the requirements of the Building Standards Law by a 50% margin. Alternatively, damage control design has been used.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ● 2.1.1.

● 2.1.2 Seismic Isolation & Vibration Damping Systems

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No seismic isolation or vibration damping systems are used.
Level 4	A vibration damping system is used.

Level 5	A seismic isolation system is used.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●2.1.2.

● 2.2 Service Life of Components

The set service life of components should ideally be identified in detail by the assessor from the life cycle plan for the construction production, examining the tenure of use of each category of materials. If the documentation is unavailable for that purpose, the assessor should refer to Table of Durability (years) of Building Elements (Appendix 1). In this documentation there may be differing service life figures for the same component, so when quoting a figure, the assessor should state the reason and basis for doing so.

● 2.2.1 Necessary Refurbishment Interval for Exterior Finishes

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct	
Level 1	Necessary refurbishment interval for exterior finishes	Less than 10 years
Level 2	Necessary refurbishment interval for exterior finishes	10 years or more, less than 20 years
Level 3	Necessary refurbishment interval for exterior finishes	20 years
Level 4	Necessary refurbishment interval for exterior finishes	21 years or more, less than 30 years
Level 5	Necessary refurbishment interval for exterior finishes	30 years or more

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●2.2.1.

● 2.2.2 Necessary Renewal Interval for Main Interior Finishes

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct	
Level 1	Necessary renewal interval for main interior finishes	Less than 5 years
Level 2	Necessary renewal interval for main interior finishes	5 years or more, less than 10 years
Level 3	Necessary renewal interval for main interior finishes	10 years
Level 4	Necessary renewal interval for main interior finishes	11 years or more, less than 20 years
Level 5	Necessary renewal interval for main interior finishes	20 years or more
Building type	Apt	
Level 1	Necessary renewal interval for main interior finishes	Less than 10 years

Level 2	Necessary renewal interval for main interior finishes	10 years or more, less than 15 years
Level 3	Necessary renewal interval for main interior finishes	15 years
Level 4	Necessary renewal interval for main interior finishes	16 years or more, less than 25 years
Level 5	Necessary renewal interval for main interior finishes	25 years or more

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●2.2.2.

● 2.2.3 Necessary Renewal Interval for Plumbing and Wiring Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct	
Level 1	(Inapplicable)	
Level 2	(Inapplicable)	
Level 3	Necessary renewal interval for plumbing and wiring materials	15 years
Level 4	Necessary renewal interval for plumbing and wiring materials	16 years or more, less than 30 years
Level 5	Necessary renewal interval for plumbing and wiring materials	30 years or more

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●2.2.3.

● 2.2.4 Necessary Renewal Interval for Major Equipment and Services

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Necessary renewal interval for major equipment and services Up to 7 years
Level 2	Necessary renewal interval for major equipment and services 7 years or more, less than 15 years
Level 3	Necessary renewal interval for major equipment and services 15 years
Level 4	Necessary renewal interval for major equipment and services 16 years or more, less than 30 years
Level 5	Necessary renewal interval for major equipment and services 30 years or more

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●2.2.4.

2.3 Reliability

Reliability expresses the ability of the building to maintain its functions in the event of an earthquake, other natural disaster or major accident. The items 1)~5) below are evaluated here for the extent to which their functions can be maintained in the event of an earthquake or other disaster.
1) HVAC system, 2) Water supply and drainage, 3) Electrical equipment, 4) Support method of machines and ducts, 5) Communications and IT equipment.
The reliability levels are set according to the basic principles below, with reference to the characteristics of the evaluated items.
Level 1: No efforts to maintain functions.
Level 3: The effects of measures taken will maintain a minimum level of equipment function in the event of a disaster.
Level 4: The effects of measures taken will maintain a partial level of equipment function in the event of a disaster.
Level 5: The effects of measures taken will maintain a largely normal level of equipment function in the event of a disaster.

2.3.1 HVAC System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Hal・Hsp・Htl・Fct
Level 1	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)
Level 3	Applicable to one of the evaluate efforts. Alternatively, there is no centralized HAVC system.
Level 4	Applicable to two of the efforts to be evaluated.
Level 5	Applicable to three or more of the efforts to be evaluated.
Building type	Sch・Rtl・Rst・Apt
Level 1	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)
Level 3	Applicable to one of the evaluate efforts. Alternatively, there is no centralized HAVC system.
Level 4	(Inapplicable)
Level 5	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of HVAC system
Select from among the methods listed below, if the air conditioning and ventilation equipment has an operation control system for multiple occupied rooms.

NO.	Efforts to be evaluated
1	Circuits are divided according to the importance of their ventilation equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the ventilation with reduced load capacity have been examined.
2	Dispersion and duplication of heat source types (electricity, gas etc.), with backups
3	Countermeasures (such as suspended pipes) have been taken to ensure that overall function can continue even when the building is partially damaged by an earthquake.
4	Circuits are divided according to the importance of their air conditioning equipment, and more important circuits are given priority in operation after a disaster. Also, ways of running the air conditioning with reduced load capacity have been planned.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
This assessment item concerns buildings with central HVAC system. Buildings which do not have centrally managed and operated systems are set at level 3.

● 2.3.2 Water Supply & Drainage

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Sch・Hal・Hsp・Htl・Apt・Fct	Rtl・Rst
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three or more of the efforts to be evaluated.	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of water supply & drainage

NO.	Efforts to be evaluated
1	Water-saving equipment is used. This is limited to cases where it is used on a majority of the installed equipment. Water-saving devices are those approved as Eco Mark products, or those equivalent to water-saving equipment that is the approval standard for Eco Mark products.
2	Plumbing systems are separated as far as possible to reduce the portions that become unserviceable in the event of a disaster.
3	The building has a pit for temporary waste water storage, in case mains sewerage is unavailable after a disaster.
4	The building has two separate tanks, one for water reception and one elevated tank.
5	Planning enables the use of well water, rainwater, gray water etc.
6	Provision of a rainwater storage tank to provide domestic noncommercial water in the event of a disaster. (Not applied to “Retailers” and “Restaurants.”)
7	The building is equipped with a simple filtration system allowing conversion of rainwater to potable water in the event of a disaster. (Not applied to “Retailers” and “Restaurants.”)

Residential and Accommodation Sections - Inapplicable

● 2.3.3 Electrical Equipment

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Hal・Hsp・Htl・Fct	Sch・Rtl・Rst・Apt
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three or more of the efforts to be evaluated.	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of electrical equipment

NO.	Efforts to be evaluated
1	The building is equipped with emergency generators. (Not applied to “Schools,” “Retailers,” “Restaurants” and “Apartments.”)
2	The building is equipped with uninterruptible power source systems.
3	Power input equipment for important equipment systems has redundancy. (Not applied to “Schools,” “Retailers,” “Restaurants” and “Apartments.”)
4	Countermeasures (i) and (ii) have been taken or (iii) applies, in order to avoid power outages due to water percolation into power supply equipment or precision machinery, and to avoid damage to data networks. (i) Installation of power supply equipment and precision machinery below ground is avoided. (ii) Devices to prevent the groundwater percolation (waterproof doors, waterproof panels, embankments, dry ditches) and drainage equipment (pumps etc.) are installed. (iii) No danger of water percolation.

Residential and Accommodation Sections - Inapplicable

● 2.3.4 Support Method of Machines & Duct

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Not adequate for level 3
Level 2	(Inapplicable)
Level 3	Earthquake resistance class B
Level 4	Earthquake resistance class A
Level 5	Earthquake resistance class S

Residential and Accommodation Sections - Inapplicable

☐ Commentary

If mechanical equipment and plumbing support methods are sufficient to prevent any hazard to occupants in the event of an earthquake, the required basic standard (earthquake resistance class B) is set to level 3. Level 4 (earthquake resistance A) ensures not only that occupant safety is secured, but also that mechanical equipment and plumbing support prevents equipment important for the building type from toppling and keeps it operable. The highest standard, level 5 (earthquake resistance class S) applies if all mechanical equipment and plumbing is prevented from toppling

and kept operable. The basic concepts of earthquake resistance are explained in the table below.

Importance of the building and its equipment	Earthquake resistance class	Earthquake resistance and safety targets
Specially important grade	S	Human safety is assured and secondary damage prevented after a major earthquake. All functions are maintained securely without major repairs.
Important grade	A	Human safety is assured and secondary damage prevented after a major earthquake. Important functions are maintained securely without major repairs.
Ordinary grade	B	Human safety is assured and secondary damage prevented after a major earthquake.

● 2.3.5 Communications & IT equipment

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Hal・Hsp・Htl・Fct	Sch・Rtl・Rst・Apt
Level 1	None is applicable to the efforts to be evaluated.	None is applicable to the efforts to be evaluated.
Level 2	(Inapplicable)	(Inapplicable)
Level 3	Applicable to one of the efforts to be evaluated.	Applicable to one of the efforts to be evaluated.
Level 4	Applicable to two of the efforts to be evaluated.	(Inapplicable)
Level 5	Applicable to three of the efforts to be evaluated.	Applicable to two or more of the efforts to be evaluated.

Efforts to improve the reliability of communications & IT equipment

NO.	Efforts to be evaluated
1	Communications methods are diversified, using optical fiber cable, metal cable, cellular telephone network, PHS network and others.
2	Connections are made from two telephone exchanges to secure two communications links. (Not applied to “Schools,” “Retailers,” “Restaurants” and “Apartments.”)
3	Countermeasures (i) and (ii) have been taken or (iii) applies, in order to avoid damage to data networks due to water percolation into precision devices (data transfer equipment, relay equipment and converters. MDF, optical fiber, Ethernet etc.). (i) Installation of precision machinery below ground is avoided. (ii) Devices to prevent the groundwater percolation (waterproof doors, waterproof panels, embankments, dry ditches) and drainage equipment (pumps etc.) are installed. (iii) No danger of water percolation.

Residential and Accommodation Sections - Inapplicable

● 3. Flexibility & Adaptability

● 3.1 Spatial Margin

The building story height, form and flexibility of spaces and surplus load capacity are evaluated to consider the potential for future changes of building type.
"Hospitals," "Hotels" and "Apartments" are evaluated for the main occupied areas on their standard floors, so they should be evaluated under Residential and Accommodation Sections.

● 3.1.1 Allowance for Story Height

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Fct
Level 1	Less than 3.3m
Level 2	3.3m or more, less than 3.5m
Level 3	3.5m or more, less than 3.7m
Level 4	3.7m or more, less than 3.9m
Level 5	3.9m or more

Residential and Accommodation Sections	
Building type	Hsp・Htl
Level 1	Less than 3.3m
Level 2	3.3m or more, less than 3.5m
Level 3	3.5m or more, less than 3.7m
Level 4	3.7m or more, less than 3.9m
Level 5	3.9m or more
Building type	Apt
Level 1	Less than 2.7m
Level 2	2.7m or more, less than 2.8m
Level 3	2.8m or more, less than 2.9m
Level 4	2.9m or more, less than 3.0m
Level 5	3.0m or more

☐ Commentary
Evaluate whether story height would pose an obstacle to changing or reinforcing building types or equipment systems.
Refer to Preliminary Design Stage Q-2 ●3.1.1.

● 3.1.2 Adaptability of Floor Layout

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Fct
Level 1	Wall length ratio 0.7 or above

Level 2	Wall length ratio 0.5 or above, less than 0.7
Level 3	Wall length ratio 0.3 or above, less than 0.5
Level 4	Wall length ratio 0.1 or above, less than 0.3
Level 5	Wall length ratio less than 0.1

Residential and Accommodation Sections	
Building type	Hsp・Htl・Apt
Level 1	Wall length ratio 0.7 or above
Level 2	Wall length ratio 0.5 or above, less than 0.7
Level 3	Wall length ratio 0.3 or above, less than 0.5
Level 4	Wall length ratio 0.1 or above, less than 0.3
Level 5	Wall length ratio less than 0.1

□ Commentary

Evaluate according to the wall length/area ratios in major occupied rooms on standard floors.
Wall length ratio is calculated by the following equation.

$$\text{Wall length/area ratio} = \frac{\text{Length of perimeter walls (m) + length of bearing walls (m)}}{\text{Exclusive area (m}^2\text{)}}$$

Refer to Preliminary Design Stage Q-2 ●3.1.2 for the details.

● 3.2 Floor Load Margin

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties		
Building type	Off・Rtl・Rst・Hal（when seatings are fixed.）・Fct	
Level 1	(Inapplicable)	
Level 2	Major rooms	Allowable floor loading Less than 2,900N/m^2
Level 3	Major rooms	Allowable floor loading 2,900N/m^2 or more
Level 4	Major rooms	Allowable floor loading 3,500N/m^2 or more
Level 5	Major rooms	Allowable floor loading 4,500N/m^2 or more
Building type	Hal（when seatings are not fixed）	
Level 1	(Inapplicable)	
Level 2	Major rooms	Allowable floor loading Less than 3,500N/m^2
Level 3	Major rooms	Allowable floor loading 3,500N/m^2 or more
Level 4	Major rooms	Allowable floor loading 4,200N/m^2 or more
Level 5	Major rooms	Allowable floor loading 4,500N/m^2 or more
Building type	Sch	
Level 1	(Inapplicable)	
Level 2	Major rooms	Allowable floor loading Less than 2,300N/m^2
Level 3	Major rooms	Allowable floor loading 2,300N/m^2 or more
Level 4	Major rooms	Allowable floor loading 2,900N/m^2 or more

Level 5	Major rooms	Allowable floor loading	3,500N/m^2 or more

Residential and Accommodation Sections			
Building type	Hsp・Htl・Apt		
Level 1	(Inapplicable)		
Level 2	Major rooms	Allowable floor loading	Less than 1,800N/m^2
Level 3	Major rooms	Allowable floor loading	1,800N/m^2 or more
Level 4	Major rooms	Allowable floor loading	2,100N/m^2 or more
Level 5	Major rooms	Allowable floor loading	2,900N/m^2 or more

☐ Commentary
"Hospitals," "Hotels" and "Apartments" are evaluated for the main occupied areas on their standard floors, so they should be evaluated under Residential and Accommodation Sections.
Refer to Preliminary Design Stage Q-2 ●3.2.

● 3.3 Adaptability of Facilities

● 3.3.1 Ease of Air Conditioning Duct Renewal Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Air conditioning ducts cannot be replaced without damaging structural elements.
Level 2	In some cases the air conditioning ducts can be replaced without damaging structural elements, if spare sleeves are used, but that method cannot be applied to all ducts.
Level 3	Space and routes for future use (future replacement work) have been provided, so that nearly all air conditioning ducts can be replaced without damaging structural elements. Alternatively, there is no central air conditioning equipment.
Level 4	Exterior air conditioning ducts are used or ceiling space provided so that ducts can be replaced without damaging either structural elements or surface finishes.
Level 5	ISS, equipment floor installation or other measures allow easy replacement of air conditioning ducts without damaging surface finishes.

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●3.3.1.

Residential and Accommodation Sections - Inapplicable

● 3.3.2 Ease of Water Supply &Drain Pipe Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Pipes cannot be replaced without damaging structural elements.
Level 2	In some cases pipes can be replaced without damaging structural elements, if spare sleeves are used, but that method cannot be applied to all ducts.
Level 3	Space and routes for future use (future replacement work) have been provided, so that nearly all water supply and drain pipes can be replaced without damaging structural elements.
Level 4	Exterior air conditioning ducts are used or ceiling space provided, so that water supply and drain pipes can be replaced without damaging either structural elements or surface finishes.
Level 5	Unit pipes, system WCs and other measures allow easy replacement of water supply and drain pipes without damaging surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●3.3.2.

● 3.3.3 Ease of Electrical Wiring Renewal Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Wiring cannot be replaced without damaging structural elements.
Level 2	(Inapplicable)
Level 3	Wiring can be replaced without damaging structural elements.
Level 4	(Inapplicable)
Level 5	Wiring can be replaced without damaging structural elements or surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary

Refer to Preliminary Design Stage Q-2 ●3.3.3.

● 3.3.4 Ease of Communications Cable Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Wiring cannot be replaced without damaging structural elements.
Level 2	(Inapplicable)
Level 3	Wiring can be replaced without damaging structural elements.

Level 4	(Inapplicable)
Level 5	Wiring can be replaced without damaging structural elements or surface finishes.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●3.3.4.

● 3.3.5 Ease of Equipment Renewal

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	There are no routes or machine hatches for replacing major equipment, so it cannot be replaced without demolishing exterior walls or other elements.
Level 2	(Inapplicable)
Level 3	There are routes or machine hatches for replacing major equipment
Level 4	(Inapplicable)
Level 5	There are routes or machine hatches for replacing major equipment, and there is backup equipment (or machine that has a backup function) to be used during the replacement period.

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●3.3.5.

● 3.3.6 Provision of Backup Space

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Entire Building and Common Properties	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There is no planned provision of space for backup equipment.
Level 4	There is planned provision of space for backup equipment.
Level 5	(Inapplicable)

Residential and Accommodation Sections - Inapplicable

☐ Commentary
Refer to Preliminary Design Stage Q-2 ●3.3.6.

Q-3 Outdoor Environment on Site

● 1. Preservation & Creation of Biotope

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0≦Credit Ratio(3) <0.2
Level 2	On the Efforts to Be Evaluated, 0.2≦Credit Ratio(3) <0.4
Level 3	On the Efforts to Be Evaluated, 0.4≦Credit Ratio(3) <0.6
Level 4	On the Efforts to Be Evaluated, 0.6≦Credit Ratio(3) <0.8
Level 5	On the Efforts to Be Evaluated, 0.8≦Credit Ratio(3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	I. A survey has been made of surrounding habitat (state of inhabiting flora and fauna, etc.)
2	1	0	II. Conservation of existing ecological resources (conservation of existing topography, topsoil, trees, bodies of water etc.)
2	1	0	III. Extensive greening 1) Thorough greening of exterior (surface) on site
2	1	0	2) Greening the building
2	1	0	3) Landscaping of green space (placement of continuous green land and voluminous vegetation to form ecological networks in the local area)
2	1	0	4) Consideration for living and growth habitat for small animals (planting of feed trees, biotopes and bird sanctuaries, use of porous materials etc.)
2	1	0	IV. Preparation of monitoring plan and management of animal habitat
2	1	0	V. Efforts to improve contacts between users and flora and fauna (creation of water parks and other contact spaces, and provision of information on related measures, etc.)
2	1	-	VI. Other
(1) Total Credits		(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage Q-3 ●1.

● 2. Townscape & Landscape

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0.0≦Credit Ratio(3) <0.2
Level 2	On the Efforts to Be Evaluated, 0.2≦Credit Ratio(3) <0.4
Level 3	On the Efforts to Be Evaluated, 0.4≦Credit Ratio(3) <0.6

Level 4	On the Efforts to Be Evaluated, 0.6≦Credit Ratio(3) <0.8
Level 5	On the Efforts to Be Evaluated, 0.8≦Credit Ratio(3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	1) Building placement and orientation responsive to the surrounding environment	
2	1	0	2) Building height and form that are responsive to the surrounding environment	
2	1	0	3) Use design elements, materials and colors that are responsive to the surroundings.	
2	1	0	4) Public space and exterior elements responsive to the surrounding environment	
2	1	0	5) Reflecting views of local residents in plan content	
2	1	-	6) Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage Q-3 ●2.

● 3. Local Characteristics & Outdoor Amenity

● 3.1 Attention to local character & improvement of comfort

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0.0≦Credit Ratio(3) <0.2
Level 2	On the Efforts to Be Evaluated, 0.2≦Credit Ratio(3) <0.4
Level 3	On the Efforts to Be Evaluated, 0.4≦Credit Ratio(3) <0.6
Level 4	On the Efforts to Be Evaluated, 0.6≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated, 0.8≦Credit Ratio(3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I.** Consideration for memories of previous uses of the land and the continuation of local culture a) The plan of the building and its exterior reflects aspects of local context, such as climate, history and culture for its function, selection of materials and operation planning.
2	1	0	b) Use of local industries, personnel and skills
2	1	-	c) Other
2	1	0	**II.** Consideration of relation between interior and exterior (Mitigation of psychological stress on occupants, etc.) d) Formation of semi-outdoor and intermediate spaces (balconies, peripheral corridors, formation of spaces to take in outside light and air movement, securing spaces for local residents to use, etc.)
2	1	0	e) Providing buffer zones (Formation of psychologically rich living spaces, sentimental expression, reconciliation between public and private, for example, entry porches for each dwelling, design measures around entrances, etc) (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	f) Other
2	1	0	**III.** Consideration for community formation in local society and among residents g) Development of community spaces and facilities that serve as centers for exchanges between residents and local society (halls, leisure rooms, community centers etc.)
2	1	0	h）Creation of spaces within the exterior space that will help to foster community relations with local residents (such as courtyard spaces open to the community)
2	1	0	i）Design of common spaces (public corridors, entrances, plazas etc.) to increase residents' contacts with local residents in daily life. (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	j）Other
2	1	0	**IV.** Participation between residents and local people k) Encouraging occupants to participate in building maintenance management.
2	1	0	l) Participation of occupants in the design process. (Applied to “Hospitals,” “Hotels” and “Apartments” only.)
2	1	-	m) Other
2	1	0	**V.** Improvement of health and comfort n) Spatial design that is aware of children's growth, and consideration for the elderly and handicapped. (Applied to “Apartments” only.)
2	1	0	o) Improvement of exterior space comfort (creation of spaces for relaxation etc.)
2	1	-	p) Other
(1) Total Credits			(2) Maximum Credits / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage Q-3 ●3.1.

● 3.2 Improvement of the Thermal Environment on Site

Building type	Off · Sch · Rtl · Rst · Hal · Apt · Hsp · Htl · Fct
Level 1	On the Efforts to Be Evaluated, 0.0 ≦Credit Ratio(3) < 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio(3) < 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio(3) < 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio(3) < 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio(3)

Level of efforts		Efforts	
Present	None		
2	0	1) Using the surrounding airflow environment to encourage air movement within the site. a) Building layout designed to draw in air movement from surrounding vegetation and open space. b) Appropriate provision of open/ green space to encourage air movement. c) Formation of routes within the site to encourage air movement.	
2	0	2) Providing green space, water surfaces and other elements within the site to alleviate the thermal environment. a) Provide as much green space (including tall trees) as possible on the site. b) Provide surface water on the site. c) Limit the range of use of materials with large heat capacities, such as asphalt concrete for paved surfaces etc.	
2	0	3) Greening the building to alleviate the thermal environment on the site. a) Building skin planting (on open decks, balconies etc.).	
2	0	4) Consider artificial heat venting positions etc. to alleviate the thermal environment on the site. a) Artificial heat venting points should be placed as high as possible. b) High-temperature heat venting points should be placed as high as possible. c) The temperature of artificial heat venting should be as low as possible.	
(1) Total Credits		(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage Q-3 ●3.2.

LR Reduction of Building Environmental Loadings

LR-1 Energy

For assessment of energy at the Execution Design and Construction Completion Stage, as it is for the Preliminary Design Stage, level 3 is equivalent to the "Standard for Judgment by Owner Regarding the Rational Use of Energy Relating to Buildings" on the Energy Saving Law of Japan. Buildings falling short of the standard score 1 or 2, while those with energy-saving performance above the standard score 4 or 5.
For buildings other than “Apartments,” the assessment method in the Energy Saving Law is used to calculate energy saving according to either the specification standard (the Point value) or performance standards (PAL or CEC values).

Building size	Specification standard (Point value)	Performance standard (PAL/CEC values)
Total floor area over 5,000m^2	×	○
5,000m^2 or less	○	○

● 1. Building Thermal Load

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl – Assessment using the specification standard (Point Value)	
Level 1	(Points) < 80pts	
Level 2	80pts ≦ (Points) < 100pts	
Level 3	100pts ≦ (Points) < 130pts.	
Level 4	130pts ≦ (Points) < 160pts.	
Level 5	160pts ≦ (Points)	
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl - Assessment using the performance standard (PAL Value)	
Level 1	Compared to the standard value 5% < (PAL value)	
Level 2	Compared to the standard value 0% < (PAL value) ≦ 5%	
Level 3	Compared to the standard value -10% < (PAL value) ≦ 0%	
Level 4	Compared to the standard value -25% < (PAL value) ≦ -10%	
Level 5	Compared to the standard value (PAL value) ≦ -25%	
Building type	Apt	
Level 1	(Inapplicable)	
Level 2	Corresponding to grade 1 of Housing Quality Assurance Law	: Falls short of level 3
Level 3	Corresponding to grade 2 of Housing Quality Assurance Law	: 1980 standards (Energy Saving Standards)
Level 4	Corresponding to grade 3 of Housing Quality Assurance Law	: 1992 standards (New Energy Saving Standards)
Level 5	Corresponding to grade 4 of Housing Quality Assurance Law	: 1999 standards (Current next-generation standards)

☐ Commentary

At the Execution Design Stage, except for “Apartments,” evaluate by Point method depend on PAL value, building size and type as specified by the Energy Saving Law.
For “Apartments,” assessment should be based on Housing Quality Assurance Law in the same way as at the Preliminary Design Stage.
Refer to Preliminary Design Stage LR-1 ●1.

● 2. Natural Energy Utilization

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	0≦ Natural energy usage <1MJ/m^2 * Include planned use for monumental purposes, as well as not using the energy.
Level 4	1MJ/m^2 ≦ Natural energy usage <20MJ/m^2
Level 5	20MJ/m^2 ≦ Natural energy usage

Efforts to be evaluated

NO.	Efforts to be evaluated
1	Use of natural light: Planning for natural light systems that use sunlight in place of lighting equipment. (e.g. Light shelves, top lights, high side lights*[13] etc.)
2	Use of natural ventilation: Planning for the use of natural ventilation and ventilation systems that are effective in replacing the use of air conditioning equipment and reducing cooling loads. (e.g. Automatic dampers, night purging, ventilation systems linked to atria, solar chimney ventilation towers etc.)
3	Use of geothermal energy: Planning for the use of geothermal heat usage systems that are effective in replacing the use of heat sources and air conditioning equipment and reducing heating and cooling loads. E.g. Cool and heat tubes and pits etc.
4	Miscellaneous: Planning for the effective use of nature in other systems.

☐ Commentary
For all buildings other than “Apartments,” a quantitative assessment of the amount of energy saved is required at the Execution Design Stage, combining direct and converted usage.
For “Apartments,” direct energy use and converted energy use should be evaluated separately. Direct energy usage is evaluated qualitatively according to the scale of use, in the same way as at the Preliminary Design Stage. Only converted use is evaluated quantitatively according to the quantity of energy saved.
Evaluate the content of natural energy use, as appropriate for the scale and purpose of the building and its surrounding conditions. At the Execution Design Stage, concentrate on quantitative assessment based on the annual primary energy usage in the building, using the results of the detailed design for both direct and converted use of natural energy.

$$\text{Natural energy usage (MJ/m}^2\text{・yr)} = \frac{\text{Annual direct usage (MJ/yr.) + Annual converted usage (MJ/yr.)}}{\text{Total floor area (m}^2\text{)}}$$

Measures that have been partially applied, or use for monumental purposes, should be evaluated as level 3, because they do not lead to practical energy-saving effects. Higher levels of effort should receive level 4 or 5, depending on the quantity of natural energy usage.

[13] High side light: windows provided by design for the effective use of natural light, installed at high place near ceiling

● 2.1 Direct Use of Natural Energy

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Apt
Level 1	(Inapplicable)
Level 2	Light intake and natural ventilation are not possible at level 3.
Level 3	Nearly all dwellings (at least 80%) have exterior walls on at least two sides, ensuring effective light intake and natural ventilation.
Level 4	In addition to the above, building measures, such as ventilation voids, have been used to enhance their efficacy. They influence a majority (50% ore more) of residential blocks.
Level 5	The building measures above cover at least 80% of residential blocks.

☐ Commentary

Refer to Preliminary Design Stage LR-1 ●2.1.

● 2.2 Converted Use of Renewable Energy

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Apt
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	0≦ Renewable energy usage <1MJ/m^2 * Include planned use for monumental purposes, as well as not using the energy.
Level 4	1MJ/m^2 ≦ Renewable energy usage <15MJ/m^2
Level 5	15MJ/m^2 ≦ Renewable energy usage

☐ Commentary

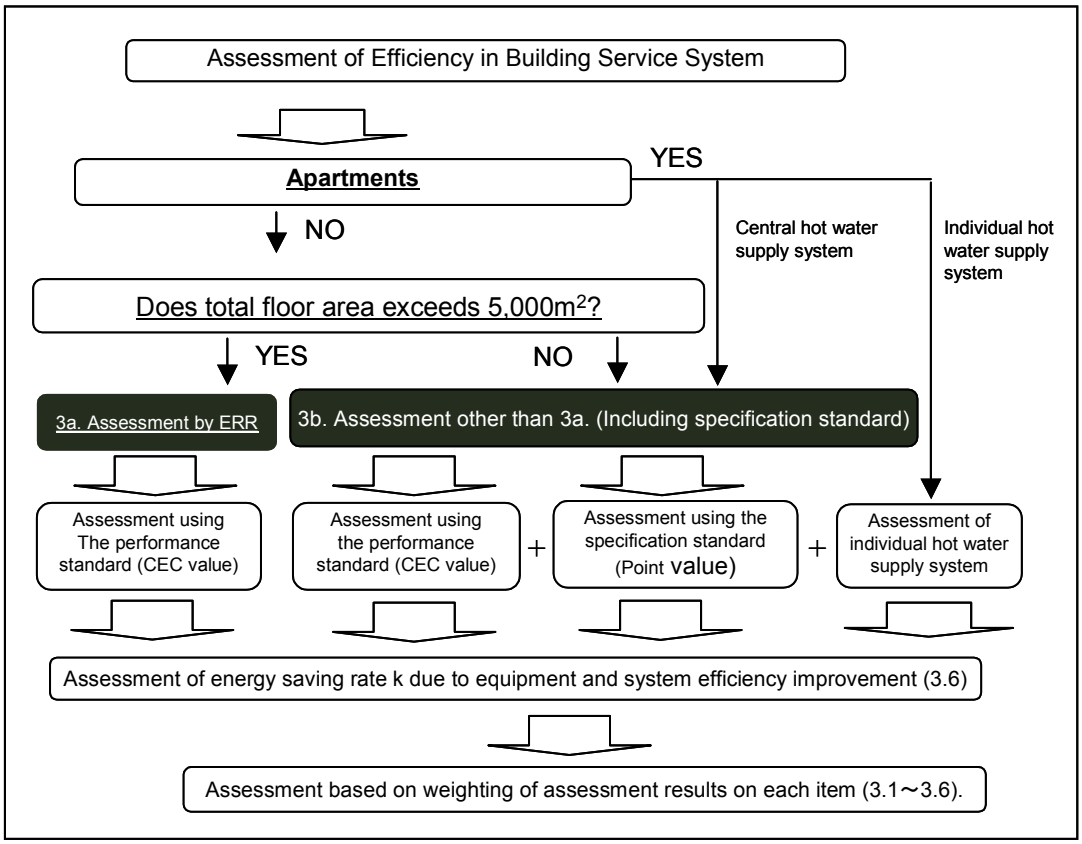
Evaluate the content of natural energy use, as appropriate for the scale and purpose of the building and its surrounding conditions. At the Execution Design Stage, concentrate on quantitative assessment based on the annual primary energy usage in the building, using the results of the detailed design only for converted use of natural energy.

$$\text{Natural energy usage (MJ/m}^2\text{・yr)} = \frac{\text{Annual converted usage (MJ/yr.)}}{\text{Total floor area (m}^2\text{)}}$$

● 3. Efficiency in Building Service System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

With the exception of “Apartments,” equipment and system efficiency enhancement in buildings should use performance standards (CEC values) or specification standards (Point values) for each equipment system regulated by the Energy Saving Law. At the Execution Design Stage, assessment by the specification standard (Point value) should be limited in application to buildings of 5,000m^2 or less, according to current regulations



3a. Assessment by ERR

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Building type	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Fct Assessment of ERR value
Level 1	(ERR value) < -5%
Level 2	-5% ≦ (ERR value) < 0%
Level 3	0% ≦ (ERR value) < 10%
Level 4	10% ≦ (ERR value) < 25%
Level 5	25% ≦ (ERR value)

NOTE) ERR is a comprehensive indicator using the CEC calculation results under the Energy Conservation Law of Japan. It expresses the rate of reduction in primary energy consumption for equipment systems, and is calculated by the formula below.

$$\text{ERR} = \frac{\text{Total amount of energy saved in the evaluated building}}{\text{Standard primary energy consumption for the evaluated building}}$$

☐ Commentary

For buildings, other than “Apartments,” in excess of 5,000m^2, base the assessment on an ERR (Energy Reduction Ratio) figure that integrates the results from CEC.

Refer to Preliminary Design Stage LR-1 ●3a.

3b. Assessment by means other than ERR

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

For buildings of 5,000m^2 or less only, with the exception of “Apartments,” evaluate according to the scoring criteria below for each equipment type, under 3.1~3.6. For “Apartments,” in the same way as at the Preliminary Design Stage, evaluate only hot water supply system.

● 3.1 HVAC System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl - Assessment using the specification standard (Point value)
Level 1	Below the corrected points K_0
Level 2	Above the corrected points and (Points) < 100pts
Level 3	100pts ≦ (Points) < 130pts
Level 4	130pts ≦ (Points) < 160pts
Level 5	160pts ≦ (Points)
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl Assessment using the performance standard (CEC-AC value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Specification standard (Point value) is applicable only for the scoring criteria of individual system for air cooling heat pump, so the performance standard (CEC-AC) should be used for central heating/ cooling plant system.

Refer to Preliminary Design Stage LR-1 ●3.1.

● 3.2 Ventilation System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts. ≦ (Points) < 120pts.
Level 4	120pts. ≦ (Points) < 140pts.
Level 5	140pts. ≦ (Points)
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl Assessment using the performance standard (CEC-V value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Refer to Preliminary Design Stage LR-1 ●3.2.

● 3.3 Lighting System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts. ≦ (Points) < 120pts.
Level 4	120pts. ≦ (Points) < 140pts.
Level 5	140pts. ≦ (Points)
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct Assessment using the performance standard (CEC-L value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Refer to Preliminary Design Stage LR-1 ●3.3.

● 3.4 Hot Water Supply System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts ≦ (Points) < 100pts
Level 3	100pts ≦ (Points) < 130pts
Level 4	130pts ≦ (Points) < 160pts
Level 5	160pts ≦ (Points)
Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct Assessment using the performance standard (CEC-HW value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary

Refer to Preliminary Design Stage LR-1 ●3.4.

Refer below for assessment of the hot water supply system (individual) of “Apartments.” (Refer to specification standard, Point value, for central hot water supply system.)

Building type	Apt (with individual heat source)
Level 1	(Inapplicable)
Level 2	Other than those listed below
Level 3	Electric water heaters (electric control type)
Level 4	Fuel-burning instant-supply water heaters
Level 5	Fuel-burning latent heat recovery instant-supply water heaters, electric CO_2-refrigerant water heater (water storage heater using night-rate electricity)

☐ Commentary
Refer to Preliminary Design Stage LR-1 ●3.4.

● 3.5 Elevators

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Htl Assessment using the specification standard (Point value)
Level 1	(Points) < 90pts
Level 2	90pts. ≦ (Points) < 100pts.
Level 3	100pts. ≦ (Points) < 120pts.
Level 4	120pts. ≦ (Points) < 140pts.
Level 5	140pts. ≦ (Points)
Building type	Off・Htl Assessment using the performance standard (CEC-EV value)
Level 1	Compared to the standard value 5% ≦ (CEC value)
Level 2	Compared to the standard value 0% < (CEC value) < 5%
Level 3	Compared to the standard value -10% < (CEC value) ≦ 0%
Level 4	Compared to the standard value -25% < (CEC value) ≦ -10%
Level 5	Compared to the standard value (CEC value) ≦ -25%

☐ Commentary
Refer to Preliminary Design Stage LR-1 ●3.5.

● 3.6 Equipment for Improving Energy Efficiency

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

☐ Commentary
Assessment indices
Energy saving rate k value
Refer to Preliminary Design Stage LR-1 ●3.6.

● 4. Efficient Operation

● 4.1 Monitoring

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The system must afford knowledge of the total quantity of energy consumption, so that energy-saving effects can be verified in operation
Level 4	There must be equipment to measure quantities of heating and cooling, gas, electricity and water for all types of energy used.*1)
Level 5	If detailed plans for energy-saving operation are to be drawn up, there must be systems to enable measurement of energy consumption volumes for each system and each piece of equipment, and a management system such as BEMS must be introduced.*2)

*1) Measurement of each type of energy.

Quantity of cooling and heating	Quantities of heating and cooling
Gas volume	Gas volume for heating and kitchen uses
Electrical power quantity	Electrical power for heat sources, air conditioning secondary equipment, ventilation, lighting, sockets and special loads (computer loads in office buildings, kitchen loads in restaurants, and other loads that account for high proportions of power consumption in applicable buildings).
Water supply volume	Water supply for heat sources and hygiene.

*2) Energy measurement for each system.

Quantity of cooling and heating	Quantities of cooling and heating for each air conditioning system
Gas volume	Gas volumes for each heat source and device, and for special uses that consume large volumes
Electrical power quantity	Power consumption for each air conditioning and ventilation device, and for each hygiene-related pump
Water supply volume	Water supply volume for each water supply demand (drinking and washing, toilet flushing, etc.)

☐ Commentary

Refer to Preliminary Design Stage LR-1 ●4.1

● 4.2 Operation & Management System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	No operation and management system has been planned.
Level 2	Organizations, systems or management policies have been planned for operation and management.
Level 3	In addition to level 2、there must be an organized operation and management system, with a designated manager.
Level 4	In addition to level 3, target values for energy consumption in the whole buildings have been planned and presented to the building owner, based on calculation of annual energy consumption.
Level 5	In addition to level 4, there must be regular verification of equipment performance during building operation, with specific actions planned for repair of malfunctions etc. (commissioning system)

☐ Commentary
Refer to Preliminary Design Stage LR-1 ●4.2.

LR-2 Resource & Materials

● 1. Water Resource

● 1.1 Water Saving

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	No systems for saving water.
Level 2	(Inapplicable)
Level 3	Major faucets are equipped with water-saving valve.
Level 4	In addition to water-saving valve, other water-saving equipment (such as flush-mimicking sound systems, water-saving toilets) is used.
Level 5	(Inapplicable)

☐ Commentary
Evaluate whether the building is equipped with systems able to save water.

● 1.2 Rainwater & Gray Water

● 1.2.1 Rainwater Use System

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No systems for using rainwater.
Level 4	Rainwater is used.
Level 5	Rainwater usage brings the rainwater usage rate to at least 20%.

☐ Commentary
Evaluate according to the reuse rate.
The rainwater usage rate is calculated by the formula below.

$$\text{Rainwater usage rate} = \frac{\text{Predicted rainwater usage volume}}{\text{Total predicted water usage (main water + rainwater use)}}$$

- 1.2.2 Gray Water Reuse Systems Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	No systems for reusing graywater.
Level 4	Graywater is reused.
Level 5	In addition to graywater reuse, there is equipment to reuse sewage.

2. Materials of Low Environmental Load

- 2.1 Recycled Materials
- 2.1.1 Efficiency of Structural Skeleton Material Reuse

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	Major structural elements are made of non-wood materials (RC/ SRC/ S), and none of the measures below are used.
Level 4	Major structural elements are made of non-wood materials (RC/ SRC/ S), and one or more of the measures below are used.
Level 5	Major structural elements are made of non-wood materials (RC/ SRC/ S), and two or more of the measures below are used.

☐ Commentary

Evaluate according to the total of the point scores for efforts to be evaluated listed below. Score one point for a measure that is used even in part, regardless of the amount of usage.

As shown in appendices 3 and 4, the usage of electric furnace steel in various construction applications stands at 60% of ordinary construction steel. Even for H sections, approximately 60% is electric furnace steel. Therefore if H sections in the design are of sectional dimensions sold by multiple electric furnace steel manufacturers, as shown in appendix 2, assume that electric furnace steel is used.

Point	Efforts to be evaluated
1	- Electric furnace steel used in major structural elements (Other than reinforcement bars)
1	- Portland blast furnace cement used in concrete portions of major structural elements
1	- Recycled aggregate used in concrete portions of major structural elements

- 2.1.2 Efficiency of Non-structural Material Reuse

Off · Sch · Rtl · Rst · Hal · Hsp · Htl · Apt · Fct

Building type	Off · Sch · Rtl · Rst · Hal · Hsp · Htl · Apt · Fct
Level 1	Total point score for reused materials is 0.
Level 2	(Inapplicable)
Level 3	Total point score for reused materials is 1.
Level 4	Total point score for reused materials is 2.
Level 5	Total point score for reused materials is 3 or more.

Point	Type	Name	Use	Name of raw materials used
1	Heat-resistant and fire-resistant materials	Regular brick	Sidewalks, cycle paths, parking lots etc.	Sewage sludge
		Regular brick	Entire building outer shell	Metal scraps (aluminum dross)
1	Waterproof materials	Urethane film waterproof materials	General building roof waterproofing Overall waterproofing repair for old impermeable layers	Waste glass
		Asphalt waterproof materials	Building waterproofing materials	Waste tires
		Impermeable layer protection materials	Concrete roofing Impermeable layer protection materials	Waste tires
1	Staircase Components	Staircase anti-slip treatment	Resilient rubber finishes for staircases	Waste tires, construction waste etc.
1	Finishing paints	Finishing paints	Interior décor finishing materials	Waste glass
		PC curtain-wall	PC curtain-wall	Waste glass (cullet)
		Sound absorption materials	Acoustic board for walls and ceilings	Expanded polystyrene waste
		Sound absorption materials	Acoustic board for walls and ceilings	Waste glass (cullet))
		Acoustic insulation panel	Reduction of noise on building staircases	Waste tires
		Press-formed flooring	Direct-laid resilient rubber flooring	Waste tires
		Flooring	Floors for food processing factories etc.	Waste glass
1	Interior and exterior décor materials	False floor	Dry false floor underlay for sound insulation	Waste particle board
		False floor	Floor panels	Waste polypropylene resin
		False floor	False floor wiring storage systems	Waste glass (cullet)
		False floor	False floors for offices	Waste glass (cullet)
		False floor	Floor panels	Fused slag from urban garbage incinerators
		Vender	For indoor and outdoor sports facilities Laminated roof board	Waste from domestic thinned timber (Cedar, cypress, pine))
		Decking	Promenade decking, play	Wood scraps from

			equipment	demolition, reused plastics
		Medium-density fiber (MDF) board	For buildings, fixtures and furniture etc.	Sawmill waste, plywood waste, thinned timber
		Thermal insulation	General residential and non-residential insulation materials	Waste paper
		Eco-bricks (walls))	Interior and exterior wall finishes	Waste glass
1	Paving materials	Paving tiles	Paving of sidewalks etc.	Tile fragments
		Paving tiles	Exterior walls, interior walls, outside walls and floors	Waste glass
		Paving tiles	Permeable, non-slip tiles (General sidewalks etc.)	Scallop shells
		Resilient paving materials	Permeable paving, playing fields, promenades	Waste tires
2	Interior and exterior décor materials	Particle board	Floors and furniture	Wood chips
2	Paving materials	Paving material blocks	Sidewalks, terraces, approach roads	Waste tires
		Paving material blocks	Sidewalks, terraces, approach roads	Sewage sludge slag
		Paving blocks	Sidewalks, terraces, approach roads	Waste glass
		Paving blocks	Paving of sidewalks, parking lots etc.	Waste plastic
		Interlocking blocks	Paving bricks	Waste clay from kilns etc.
		Interlocking blocks	Paving bricks	Fire-resistant brick fragments
		Interlocking blocks	Paving bricks	Waste glass

NOTE) The reused materials shown above were compiled from the documents and publications below:
(1) The Committee for the Promotion of Recycling of Construction By-product, Guide to Recycled construction Materials, 1999
(2) "The Encyclopedia of Recycling, "Maruzen Co., Ltd., 2001
Refer to Preliminary Design Stage LR-2 ●2.1.

● 2.2 Timber from Sustainable Forestry Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Evaluate by the usage ratio for timber produced from sustainable forests out of the total volume of timber used.

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	Timber from sustainably managed forests is not used.
Level 3	Timber from sustainably managed forests supplied less than 10% of timber usage. Or, timber is not used, even in the structure.
Level 4	Timber from sustainably managed forests supplies 10~50% of timber usage.
Level 5	Timber from sustainably managed forests supplies 50% or more of timber usage.

☐ Commentary
Refer to Preliminary Design Stage LR-2 ●2.2.

● 2.3 Materials with Low Health Risks

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	There is no building material category without substances specified in the Pollutant Release and Transfer Register Law. Or have not been confirmed.
Level 4	There are 1~3 building material categories without substances specified in the Pollutant Release and Transfer Register Law.
Level 5	There are 4 building material categories without substances specified in the Pollutant Release and Transfer Register Law.

☐ Commentary

Evaluate the level of use of low health risk materials used in the building by finding how many of the eight categories (adhesives, sealants, waterproofing work materials, anti-corrosion treatments, undercoats, floor covering and preservatives) are free of substances specified in the Labor Safety and Health Law and the Pollutant Release and Transfer Register Law (PRTR Law).
Refer to Preliminary Design Stage LR-2 ●2.3.

● 2.4 Reuse of Existing Building Structure etc.

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	The existing building skeleton is not reused, or there is no existing building on the site to use.
Level 4	The existing building skeleton is partially reused.
Level 5	The existing building skeleton is completely reused.

☐ Commentary

Evaluate efforts to reuse existing buildings. When this assessment is made, the specific content of related measures must be stated (reuse of existing piled foundations, reuse of structural skeleton, preservation of building perimeter, etc.). Evaluate as level 3 if there was no existing building on the site when the design process began. Refer to Preliminary Design Stage LR-2 ●2.4.

● 2.5 Reusability of Components and Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	None of the evaluated measures to encourage recycling of materials on demolition has been used.
Level 4	One or more of the evaluated measures to encourage recycling of materials on demolition has been used.
Level 5	Two or more of the evaluated measures to encourage recycling of materials on demolition have been used.

Point	Efforts to be evaluated
1	The structure and finishing materials can be separated easily.
1	Interior finishes and equipment are not entangled, and each can easily be removed separately for demolition, refurbishment and remodeling.
1	Reusable unit materials are used.

● 2.6 Avoidance of CFCs & Halons

● 2.6.1 Fire Retardant

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Halon fire retardant is used.
Level 2	(Inapplicable)
Level 3	Only used in “Critical-use.”
Level 4	No halon fire retardant is used.
Level 5	(Inapplicable)

☐ Commentary

Refer to Preliminary Design Stage LR-2 ●2.6.1.

● 2.6.2 Insulation Materials

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	Insulation foaming materials with OPD= 0.2 or above are used.
Level 2	Insulation foaming materials with OPD= 0.01 or more, less than 0.2 are used
Level 3	Insulation foaming materials with OPD= 0.0 or more, less than 0.01 are used.
Level 4	(Inapplicable)
Level 5	Insulation foaming materials with ODP=0 and low GWP (less than 50, by 100-yr GWP), or natural materials are used. Or no insulation foaming material is used.

☐ Commentary

Refer to Preliminary Design Stage LR-2 ●2.6.2.

● 2.6.3 Refrigerants

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	(Inapplicable)
Level 2	HCFC is used as the refrigerant
Level 3	Refrigerant of ODP=0 is used as the refrigerant.
Level 4	Natural refrigerants and new chilling systems (ODP=0) are used.
Level 5	(Inapplicable)

☐ Commentary

Refer to Preliminary Design Stage LR-2 ●2.6.3.

LR-3 Off-site Environment

● 1. Air Pollution

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

For building type other than “Apartments, “evaluate by table below

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Fct
Level 1	Gas and dust concentrations at sources of NOx, SOx and dust exceed the emission standards set by the Clean Air Law or local ordinances.
Level 2	(Inapplicable)
Level 3	Gas and dust concentrations at sources of NOx, SOx and dust are reduced to below the emission standards*1 set by the Clean Air Law or local ordinances.
Level 4	Gas and dust concentrations at sources of NOx, SOx and dust are considerably reduced to below the emission standards*2 set by the Clean Air Law or local ordinances to a large extent.
Level 5	No combustion equipment is used and no air pollutant is generated from hypothetical enclosed space of target building and discharged to outside space.

NOTE) The criterion for concentration level is the Clean Air Law or the local ordinance, whichever is more stringent.
*1) For level 3, the concentration level should be limited to below the standard value and over 90% of the standrd value.
*2) For level 4, the emission concentration should be limited to below 90% of the standard value.

For building type other than “Apartments,” evaluate by table below

Building type	Apt
Level 1	On the Efforts to Be Evaluated, 0 ≦ Credit Ratio (3) < 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦ Credit Ratio (3) < 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦ Credit Ratio (3) < 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦ Credit Ratio (3) < 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦ Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	**I. Efforts within the building or the residential section** 1) Selection of low-NOx and low-SOx equipment types (individual system))	
2	1	0	2）Selection of low-NOx and low-SOx equipment types.(central system)	
2	1	0	3）Use of clean fuels, such as natural gas and low-sulfur fuel.	
2	1	0	4）Existence of an operation monitoring plan	
2	1	-	5）Other	
1	1	0	**II. Efforts within the exterior** 6）Use of plants to absorb NOx, SOx and dust.	
1	1	0	7）Use of atmospheric purification systems, such as photocatalysis and soil cleaning.	
1	1	-	8) Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

For 1), select “Exclude” when only centralized systems are used. And for 2), select “Exclude” when only systems for each dwelling are used.

☐ Commentary

If the building type is “Offices,” “Schools,” “Retailers,” “Restaurants,” “Halls,” “Hospitals,” “Hotels,” “Factories,” evaluate according to the rate of reduction between the emission standard and the actual emission gas concentrations for each device. If the equipment specifications have not been determined at the Execution Design and Construction Completion stages, evaluate according to the planned equipment, or the equipment specifications set as goals to work towards.

Apartments commonly use individual air conditioning systems, so evaluate according to content of any efforts made.

Assessment according to the above table of efforts is appropriate where there are combustion systems on site. If absolutely no atmospheric pollutants are generated on site, level 5 should be awarded without reference to the table (because CASBEE only evaluates loads from within the hypothetical closed space to space outside). Fully electrified housing, and buildings belonging to building multi-systems or local heating and cooling systems, which do not use combustion equipment, should be graded level 5.

For “Apartments,” refer to Preliminary Design Stage LR-3 ●1 Air Pollution for the details of each assessment items.

☐Assessment method for multiple devices (for “Offices,” “Schools,” “Retailers,” “Restaurants,” “Halls,” “Hospitals,” “Hotels”, “Factories”）

If there are multiple devices of varying specifications (atmospheric pollutant concentrations), calculate the total output for each equipment types (total of standard outputs). (See table below)

Calculation method for multiple devices（sample）

①Specifications	②Total equipment output (kW)	③Coefficient	④=①×③
Concentration level 80%	300	300/450＝0.67	0.536
Concentration level 85%	100	100/450＝0.22	0.187
Concentration level 100%	50	50/450＝0.11	0.11
	450	Total	0.833（83%）

■Reference) Standards set by the Clean Air Law
The Clean Air Law sets emission standards for "dust and smoke generating facilities" such as boilers, specifying standards for emissions of NOx, SOx, dust and other substances, with separate values for each type and size of facility.(Excerpted from the reference)[-3]

Category	Atmospheric pollutants	Main sources	Environmental standards	Emission standards etc.
Soot and smoke	Sulfur oxides (SOx)	Generation by combustion in soot and smoke generating facilities such as boilers.	As sulfur dioxide, (1) Daily average of one-hour values not exceeding 0.04 ppm. (2) one-hour value not exceeding 0.1ppm.	$q=K\times10^{-3}\times He^2$($m^3N/h$) (weight restriction) General emission standard: K=3.0~17.5 Special emission standard: K=1.17~2.34
	Dust		As suspended particles, (1) Daily average of one-hour values not exceeding 0.10mg/m3. (2) One-hour value Not exceeding 0.20mg/m3	General emission standard: 0.05~0.7g/m3N (devices pre-dating 31st May 1982), 0.04~0.5g/m3N (devices since 1st June 1982). Includes waste incinerators built after 1st July 1998. Special emission standard: 0.03~0.3g/m3N (includes small boilers installed between 10th September 1985 and 9th September 1990).
Harmful substances	Dust Nitrogen oxides (NOx)	Generation by combustion, synthesis, fractionation and pressurization etc., in soot and smoke generating facilities such as factories.	As NO2, daily average of one-hour values in the 0.04~0.06ppm zone or below.	New construction: 60~1,200ppm Older construction: 90~2,000ppm
General dust	General dust	Generation of dust by crushing, sorting and other mechanical processes, or by accumulation, in general dust-generating facilities.	As suspended particles, (1) Daily average of one-hour values not exceeding 0.10mg/m3. (2) One-hour value Not exceeding 0.20mg/m3	Structural/ operational/ management standard of dust generating facilities for Installing dust collection materials, anti-dust covers and hoods, spraying of water from sprinklers.
Specified dusts	Specified dusts (asbestos)	Generation by breaking, mixing, cutting and other processing of asbestos in specified dust-generating facilities		Regulation standard (on the site boundary) 10 fibers/liter

■Appendix) Ministry of the Environment, NOx emission guidelines for small scale combustion equipment, Tokyo Metropolitan Government, “The outline of certification for low NOx emission type combustion equipment such as boilers for business use”

● 2. Noise, Vibration & Odor

● 2.1 Noise & Vibration

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Fct	Hsp・Htl・Apt
Level 1	On the Efforts to Be Evaluated, 0.0≦Credit Ratio (3)<0.2	On the Efforts to Be Evaluated, 0.0 ≦Credit Ratio (3)< 0.1
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4	On the Efforts to Be Evaluated, 0.1 ≦Credit Ratio (3)< 0.2
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I. Dwellings section** 1) Noise generated by the exterior machinery of air conditioning systems for individual dwellings should be evaluated according to the type of equipment, the installation location, installation spacing and the presence of noise countermeasures. (Applied to “Apartments” only)
2	1	-	2）Other (Applied to “Apartments” only)
2	1	0	**II. Entire building and Common Properties** 3) Selection of low-noise/ -vibration, equipment types.
2	1	0	4) Consideration of the installation positions of equipment that generates vibration and noise, and countermeasures against those sources (sound absorbers, sound-absorbent lagging, vibration-damping structure, etc.).
2	1	0	5) Consideration for background noise from extractor fans or other sources in the building (positioning of extractor, ventilation and other openings, measures taken on fans, etc.).
2	1	0	6) The presence of measures to reduce wind roar generated by building exterior materials and other sources.
2	1	0	7) Measures to prevent the propagation of noise to adjacent land (anti-noise measures such as sound-baffling walls and trees etc.).
2	1	0	8）Presence of measures to reduce the impact of noise on adjacent areas (caused by automobile and motorbike parking areas on the site).
2	1	-	9）Other
(1) Total Credits			(2) Maximum Credits / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage LR-3 ●2.1.

● 2.2 Odors

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0.0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	1) Measures targeting sources of odor.（Not applied to “Apartments.”.）	
2	1	0	2）Installation of equipment to eliminate or reduce offensive odors.（Not applied to “Apartments.”）	
2	1	0	3）Measures against waste (organic garbage etc.) generated by building operation	
2	1	-	4）Other	
(1) Total Credits			(2) Maximum Credits	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage LR-3 ●2.2.

● 3. Window Damage & Sunlight Obstruction

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4
Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Effort	
High	Low	None		
2	1	0	**I.** Prediction of wind damage 1) Conduct a preliminary survey of wind speed and direction and related factors in the area.	
2	1	0	2）Use of simulations and other tools to predict wind damage.	
2	1	0	**II.** Restriction of wind damage 3）Measures to restrict generation of strong wind	
2	1	0	4）Measures to reduce the impact of wind damage	
2	1	0	**III.** Restriction of sunlight obstruction 5）Consideration of shade cast on adjacent sites	
2	1	-	6）Other	
(1) Total Credits			(2) Maximum Credits=	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary design stage LR-3 ●3.

● 4. Light Pollution

Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct

Building type	Off･Sch･Rtl･Rst･Hal･Hsp･Htl･Apt･Fct
Level 1	(Inapplicable)
Level 2	(Inapplicable)
Level 3	On the Efforts to Be Evaluated, 0.0 ≦Credit Ratio (3)< 0.3
Level 4	On the Efforts to Be Evaluated, 0.3 ≦Credit Ratio (3)< 0.6
Level 5	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts	
High	Low	None		
2	1	0	1) Outdoor illumination and light that spills from interiors	
2	1	0	2) Light pollution from advertising displays	
2	1	0	3) Reflected solar glare from building walls	
(1) Total Credits=			(2) Maximum Credits=	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage LR-3 ●4.

● 5. Heat Island Effect

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, Credit Ratio (3) = 0 or more, less than 0.2
Level 2	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.2 or more, less than 0.4
Level 3	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.4 or more, less than 0.6
Level 4	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.6 or more, less than 0.8
Level 5	On the Efforts to Be Evaluated, Credit Ratio (3) = 0.8 or more

Efforts to be evaluated

Level of efforts		Efforts
Present	None	
2	0	1) Air movement leaving the site has been considered, and efforts have been made to reduce thermal impact. [1] Buildings are arranged so that they do not block existing paths of air movement. [2] Buildings are arranged so that they do not block paths of air movement in midsummer. [3] Provision of paths within the site, and provision of adequate spacing between buildings. [4] Appropriate building height and form for block spacing to avoid blocking air movement.
2	0	2) Exterior cladding materials have been considered, and efforts have been made to reduce thermal impact outside the site. [1] Select highly water-retaining and water-permeable path paving materials (paved surfaces). [2] Selection of paving materials for paths etc. with low solar absorption rate
2	0	3) Cladding materials of outside wall have been considered, and efforts have been made to reduce thermal impact outside the site. [1] Selection of building roofing materials with low solar absorption rate and high long-wavelength emission rates. [2] Selection of wall materials with low solar absorption rates. [3] Promotion of greening on building exterior surfaces (roof and wall).
2	0	4) Efforts have been made to reduce artificial heat emissions. [1] Use of energy-saving perimeter materials. [2] Use of energy-saving equipment. [3] Exploitation of natural energy (sunlight, wind, etc.) [4] Exploitation of unused energy (urban waste heat present in areas near the site, etc.). [5] Introduction of high-efficiency infrastructure [6] Shifting the heat discharge peak. * On evaluate when considering daytime conditions.
(1) Total Credits=	(2) Maximum Credits=	(3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage LR-3 ●5.

● 6. Load on Local Infrastructure

Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct

Building type	Off・Sch・Rtl・Rst・Hal・Hsp・Htl・Apt・Fct
Level 1	On the Efforts to Be Evaluated, 0 ≦Credit Ratio (3)< 0.2
Level 2	On the Efforts to Be Evaluated, 0.2 ≦Credit Ratio (3)< 0.4

Level 3	On the Efforts to Be Evaluated, 0.4 ≦Credit Ratio (3)< 0.6
Level 4	On the Efforts to Be Evaluated, 0.6 ≦Credit Ratio (3)< 0.8
Level 5	On the Efforts to Be Evaluated, 0.8 ≦Credit Ratio (3)

Efforts to be evaluated

Level of efforts			Efforts
High	Low	None	
2	1	0	**I. Efforts to reduce rainwater drainage load** 1) Measures to encourage rainwater percolation to the ground (Topsoil conservation, permeable paving, permeable catch basin, percolation pipes, etc.)
2	1	0	2) Provision of facilities for temporary rainwater storage (Installation of rainwater storage tanks, drainage basins, drainage facilities etc.)
2	1	-	3) Other
2	1	0	**II. Efforts to reduce sewage treatment load** 4) Advanced purification of sewage and reduction of the discharge volume
2	1	-	5) Other
2	1	0	**III. Efforts to reduce automobile usage** **IIIa. Use of bicycles (use of alternative modes of transport)** 6) Provision of bicycle parking space for building users
2	1	0	7) Consideration for the convenience of bicycle parking area users (Make sure the parking area is easy to move in and out of, and is in a convenient location).
2	1	-	8) Other
2	1	0	**IIIb. Efforts to provide appropriate car parking space.** 9) Calculation of traffic loads generated on surrounding roads (when planning car parking)
2	1	0	10) Provision of an appropriate number of parking spaces (As a way of avoiding congestion and street parking in nearby roads)
2	1	0	11) Provision of parking facilities for unloading goods vehicles.（Not applied to “Apartments.”）
2	1	0	12) Consideration for the placement of parking lot access roads
2	1	-	13) Other
2	1	0	**IV. Efforts to reduce garbage treatment load** 14) Facilities and equipment for sorted garbage collection (Separate garbage boxes, a stock yard for sorted garbage, etc.)
2	1	0	15) Devices and facilities for reducing the volume and weight of garbage and composting suitable waste (disposers, composters etc.).
2	1	-	16) Other
(1) Total Credits=			(2) Maximum Credits= / (3) Credit Ratio [(1)/(2)] =

☐ Commentary

Refer to Preliminary Design Stage LR-3 ●6.

Bibliography

Preliminary Design Stage
Q-1 Indoor Environment
1）Indoor Environment Forum, Post-Occupancy Evaluation Method for Office (popular edition), 1994, Former Ministry of Construction, Builsing Research Institute
2）“Sanitation Management Standard for Buildings” under the Law for Maintenance of Sanitation in Buildings (Building Sanitation Law)
3）The Healthcare Engineering Association of Japan, Guidelines for Design and Control of Hospital Air Control Facilities (HEAS-02-1998)
4）Ministry of Education, Culture, Sports, Science and Technology, “School Sanitation Standards” under the School Health Law
5）Tokyo Metropolitan Government, “Table of sanitation standards for metropolitan schools”
6）Japanese Ministry of Land, Infrastructure and Transport, Standards and Procedures for Building Equipment
7）ANSI／ASHRAE－55－1992 ASHRAE STANDARD
8）“Japan Housing Performance Standard” under Housing Quality Assurance Law
9）Architectural Institute of Japan, Daylight Illuminance Calculation Method
10）Illumination Engineering Institute of Japan, “Lighting of Indoor Work Places JIES-008,” 1999
11）Japan Industrial Standard, , “JIS (Japan Industrial Standards) Z9110,” 1979
12）“The Draft of Technical Standard (ordinance, notification)” under revised Building Standard Law
13）New School Sanitation Standards of the Ministry of Education, Culture, Sports, Science and Technology
14）Shinichi Tanabe, Indoor Chemical Pollution
15）Society of Heating, Air-conditioning and Sanity Engineering of Japan, SHASE 102 Ventilation Standard and the Commentary
16）Raymond J Cole,Nils Larsson,GBC’98：Building Assessment Manual，1998
17）”Check Points on Architectural Regulations for Building Design,” Toshiyuki Nomura, KengoNomura
18）Cole,R.J.,Rousseau,D.,and Theaker,I,T.,Building Environment Performance Assessment Criteria:Version 1,-Office Buildings,The BEPAC Foundation,Vancouver,December 1993
19）US Green Building Council,LEED(Buildings:Leadership in Energy and Environmental Design),Rating System Version 2.0,Jun 2001

Q-2 Quality of Service
20）Indoor Environment Forum, Post-Occupancy Evaluation Method for Office (POEM-O popular edition), 1994
21）New Office Promotion Association and Research Committee on Office Standard and System, New Office Minimum, May 1994
22）Sano Inoue and Yamada, Architectural Planning – Basics and Application to Building Design
23）Nobuko Ogawa, Midori Nomura, Yoko Abe and Yoshihiko Kawauchi, “The Trend in Barrier-free Environment”
24）Website of Japanese Ministry of Land, Infrastructure and Transport http://www.mlit.go.jp/jutakukentiku/build/hbl.htm
25）Hisao Kajiyama, The approach to Universal Design – Architecture, Urban and Product Design
26）Architectural Institute of Japan, We need comfortable office environment; The assessment method for occupancy environment
27）Building and Equipment Life Cycle Association, Survey Report on Service Lives of Building Structural Elements, Components and other Element
28）The Building Center of Japan, Design and Construction Guidelines for Earthquake Resistance in Building Services – 1997 Edition
29）The Society of Heating, Air-conditioning and Sanitary Engineers, Design and Construction Method for Earthquake Resistance in Building Services
LR-1 Energy
30）Institute of Building Environment and Energy Conservation, Energy Saving Standards and Calculation Methods for Buildings

31）Institute of Building Environment and Energy Conservation, “Text for the building Environment And Energy Conservation Workshop 2002,” p169
32）Sawachi, et.al., “Calculation and Estimation of Energy Consumption Supply Unit by Building Applications, No.1,” Journal of Architecture, Planning and Environmental Engineering (Transactions of AIJ), Vol. 462, P41-48, August 1994

LR-3 Off-site Environment

33）Environment Agency, Handbook on Trees for the Purification of Atmospheric Pollution, 1990
34）The Pollution-related Health Damage Compensation and Prevention Association, Manual on Trees for the Purification of Atmospheric Pollution, 1995
35）Ministry of Economy, Trade and Industry, Technology and Regulations on Pollution Prevention – Noise
36）The Wind Engineering Institute, Knowledge of Building Winds – new edition
37）Shuzo Murakami and Yoshiteru Iwasa et al., “Wind Environment Survey and Research into Evaluation Yardsticks Based on Residents’ Logs,” Transactions of AIJ, 1983
38）Ministry of the Environment, Light Pollution Countermeasure Guidelines
39）Japan Housing Association, Environment-friendly Home Building

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Q-1 Indoor Environmnet

40）Indoor Environment Forum, Post-Occupancy Evaluation Method for Office (POEM-O popular edition), 1994
41）Architectural Institute of Japan, Standards and Design Guidelines for Building Sound Insulation Performance, 1998
42）Architectural Institute of Japan, Handbook of Building Environmental Design 1 – Environment, 1978
43）The Society of Heating, Air-conditioning and Sanitary Engineers of Japan, Handbook of Air-conditioning and Sanitary Engineering, Volume 3 Air-conditioning Equipment Design, 1995
44）Architectural Institute of Japan, Design Guidelines for Sound Insulation of Building, 1998
45）Sakamoto et.al., Sound Reduction Design for Air-Conditioning Equipment, 1976
46）The Society of Heating, Air-conditioning and Sanitary Engineers of Japan, Handbook of Air-Conditioning and Sanitary Engineering
47）“Japan Housing Performance Standard” under Housing Quality Assurance Law
48）Illumination Engineering Institute of Japan, “technical Guidelines for Office Illumination,” 2001
49）Illumination Engineering Institute of Japan, “technical Guidelines for Office Illumination JIIEG-008,” 2001
50）Building Management Education Center, Building Environmental Health Management
51）Kouichi Ikeda, Mechanisms of Indoor Atmospheric Pollution
52）Midori Yoshikawa et.al., Indoor Pollution and Allergies
53）”Special Edition –The Complete Bible of Sick House Countermeasures,” Monthly Architecture Magazine – Kenchiku Chishiki, March 2001
54）Midori Yoshikawa et.al., Mite, mold and cendensation

Appendix Documents

1. Table of durability (years) of building elements

Classification		By construction type	Service life	Specifications etc.	Source	Notes
Structural skeleton		Steel reinforced concrete	At least 75 years		Yoda	From a 1969 survey of the Yokohama Mitsui & Co. Building (construction completed in 1969)
			117 years		Iizuka	Estimated from a survey of wear reduction in telephone exchange buildings (building maintenance management).
			At least 50 years		Shinozaki	Survey of reinforced concrete structures aged approximately 50 years (AIJ anthology of convention speeches '74)
			At least 60 years		Kasino	Durability can be secured in ordinary concrete design when the progress of neutralization is used as an indicator (Basic Observations on Long-Life Construction)
			65	Slump 18	Gov.Bld.Dept.	Planned years to renewal
Building Exterior	Roof	Asphalt Waterproofing	20	Counterweight concrete	AIJ	
			30	Counterweight concrete (t=80)	Gov.Bld.Dept.	
			25	Counterweight cinders	NTT	
			25	With protective layer	Kobayashi	
			30	Counterweight concrete	BELCA	
		Waterproof sheet	20		Kobayashi	Polymer waterproof sheet
			20	Exposed	NTT	Synthetic polymer waterproof roofing sheet
			15	Exposed, silver coating	BELCA	Ronloop or equivalent, T=20
		Painted waterproofing	15		Kobayashi	Polymer coating waterproofing
			20		NTT	Urethane-type x1
		Mortar finish	15	Double coating	AIJ	Mortar service life
			15	Double coating	NTT	Mortar service life
			15		Kobayashi	Mortar service life
		Tile	10		AIJ	Tile service life
			10		NTT	Tile service life
			10		Kobayashi	Tile service life
			30		Gov.Bld.Dept.	Service life is 10 years -10% repair for the waterproof course, mortar bed and tiles.
			30		BELCA	Service life is 10 years -10% repair for the waterproof course, mortar bed and tiles.
		Aluminum coping	40		Gov.Bld.Dept.	
			40		BELCA	
	Outer walls	Stones	25	Granite	AIJ	
			65	Granite	Gov.Bld.Dept.	Inada type or equivalent Polished finish
			25	Granite	NTT	
			25	Granite	Kobayashi	
			60	Granite	BELCA	Inada type or equivalent Polished finish
		Tiling	50	Dry, rectangular, biscuit fired	AIJ	Including partial terracotta finish
			40	Embedded porcelain tile	Gov.Bld.Dept.	
			60	4.7cm square tiles	NTT	
			50	Porcelain	Kobayashi	
			60	Embedded porcelain tile	BELCA	40 years for floating method construction
		Synthetic resin spraying	25		AIJ	Lysin finish
			15	Mortar setting bed	Gov.Bld.Dept	Emulsion finish
			25	Mortar setting bed	NTT	Lysin finish

Classification		By construction type	Service life	Specifications etc.	Source	Notes
			25		Kobayashi	Lysin finish
			30	Mortar setting bed	BELCA	Acrylic lysin
		Epoxy-type sprayed tile	15	Concrete underlay	BELCA	
	Curtain wall	Aluminum	40		Kobayashi	
			40		BELCA	Panel mounting
		PC sheet	65	Embedded mosaic tiles	Gov.Bld.Dept	
			60	Small embedded tiles	BELCA	
	Exterior ceilings (eaves)	Aluminum moulding	30		Gov.Bld.Dept.	
			40		BELCA	
		Stainless steel moulding	40		Gov.Bld.Dept.	
			40		BELCA	
		Boarding	25	Plasterboard	AIJ	
			20	Flexible board	Gov.Bld.Dept.	EP finish
			25	Flexible board	BELCA	EP finish
	Exterior fittings	Steel fittings	35		AIJ	
			30		Gov.Bld.Dept.	OP coating
			50		NTT	
			30		Kobayashi	
			35		BELCA	Ready-mixed synthetic resin paint
		Aluminum fixtures	40		Gov.Bld.Dept.	
			40		Kobayashi	
			40		BELCA	
		Stainless steel entry/ exit doors	40	4,400 x 2,500	Gov.Bld.Dept.	Automatic staineless steel double-opening doors
			60	4,334 x 2,800	BELCA	Stainless steel entrance unit
		Synthetic resin on steel (painted)	5		Gov.Bld.Dept.	
			5		NTT	
			6		Kobayashi	
			3		BELCA	
	Exterior Misc	Roof railings (steel)	25	Wire mesh	AIJ	Steel columns
			30		Gov.Bld.Dept.	Painted every 5 years
			25	Wire mesh	Kobayashi	
			25		BELCA	Painted every 3 years
		Roof railings (stainless steel)	65	H = 1,100	Gov.Bld.Dept.	
			60	H = 1,100	BELCA	
		Roof railings (aluminum)	40	H = 1,100	Gov.Bld.Dept.	
			40	H = 1,100	BELCA	
		Steel fire escape staircase	30	Aluminum	Kobayashi	
Building Interior	Floors	Granite	65	Inada type or equivalent	Gov.Bld.Dept.	
			60	Inada type or equivalent	BELCA	
		Marble	65		Gov.Bld.Dept.	
			60		BELCA	
		Terrazo block	30		AIJ	
			65		Gov.Bld.Dept.	
			30		NTT	
			30		Kobayashi	
			50		BELCA	
		Tiling	30	Hard	AIJ	
			65	Ceramic tile	Gov.Bld.Dept.	
			30		NTT	
			30		Kobayashi	
			50	Ceramic tile	BELCA	
		Mortar finish	20	Mortarboard	AIJ	
			30	Mortarboard	Gov.Bld.Dept.	
			25	Mortarboard	NTT	
			20	Mortarboard	Kobayashi	
			30	Mortarboard	BELCA	

Classification		By construction type	Service life	Specifications etc.	Source	Notes
		PVC tiling	20	Mortar setting bed	Gov.Bld.Dept.	Semi-hardened
			20	Mortar setting bed	NTT	
			20	Mortar setting bed	Kobayashi	
			30	Mortar setting bed	BELCA	Semi-hardened
		Vinyl flooring sheet	18	Mortarboard	AIJ	
			20	Mortarboard	Gov.Bld.Dept.	Polyvinyl chloride sheet (LONLEUM) or equivalent
			20	Mortarboard	NTT	
			30	Mortarboard	BELCA	Polyvinyl chloride sheet (LONLEUM) or equivalent
		Carpet	20	Mortar setting bed	Gov.Bld.Dept.	Tile carpet
			15	Mortar setting bed	Kobayashi	Needle-punched carpet
			30	Mortar setting bed	BELCA	Contract carpet
	Inner walls	Granite	65	Inada type or equivalent	Gov.Bld.Dept.	
			60	Inada type or equivalent	BELCA	
		Marble	65		Gov.Bld.Dept.	
			60		BELCA	
		Terrazo block	40		AIJ	
			65		Gov.Bld.Dept.	
			50		BELCA	
		Tiling	30	White narrow tile	AIJ	
			65	Porcelain tile	Gov.Bld.Dept.	
			10		NTT	
			50		Kobayashi	
			50	Porcelain tile	BELCA	
		Mortar finish	20		AIJ	
			65	EP coating	Gov.Bld.Dept.	Repainted every 10 years
			36		NTT	
			30	EP coating	BELCA	Repainted every 5 years
		Multi-layer painted finish	20	Mortar setting bed	Gov.Bld.Dept.	Service life, including undercoat (repainted every 10 years (60%)
			10		NTT	Service life for paint only
			30	Mortar setting bed	BELCA	Service life, including undercoat (repainted every 10 years (90%)
		Vinyl wallpaper	20	Plywood underlay	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)
			10		NTT	Service life for wallpaper only
			30	Plywood underlay	BELCA	Service life of underlays (replaced every 10 years)
		Vinyl wallpaper	20	GL method, PB T=12	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)
			20	GL method, PB T=12	BELCA	Service life of underlays (replaced every 10 years)
		Walnut veneering	20	T=9, with furring strips	Gov.Bld.Dept.	
			20	T=9, with furring strips	BELCA	
		Melamine-faced board	30	T=9, with furring strips	Gov.Bld.Dept.	
			30	T=9, with furring strips	BELCA	
	Ceilings	Aluminum moulding	30	Light steel underlay	Gov.Bld.Dept.	
			60	Light steel underlay	BELCA	
		Boards	25	Plasterboard	AIJ	
			30	Faced plasterboard	Gov.Bld.Dept.	
			25		NTT	
			25		Kobayashi	
			30	Faced plasterboard	BELCA	
		Vinyl wallpaper	30	PB underlay, T=9	Gov.Bld.Dept.	Service life of underlays (replaced every 10 years)

Classification		By construction type	Service life	Specifications etc.	Source	Notes
			30	PB underlay, T=10	BELCA	Service life of underlays (replaced every 10 years)
		Synthetic resin spraying	20	Concrete underlay	Gov.Bld.Dept.	
			60	Concrete underlay	BELCA	
	Interior fixtures	Aluminum fixtures	40		Gov.Bld.Dept.	
			50		Kobayashi	
			50		BELCA	
		Steel fixtures	45		AIJ	
			30	OP coating	Gov.Bld.Dept.	
			40	OP coating	BELCA	
		Wooden fixtures	28		AIJ	Flush door
			30		Gov.Bld.Dept.	Flush door
			30		NTT	
			28		Kobayashi	
			30		BELCA	Flush door
	Misc. other	Toilet screens	40	Terrazo block panel	AIJ	
			65	Terrazo block panel	Gov.Bld.Dept	
			30	Terrazo block panel	BELCA	However, related finishes have a large influence
		Toilet screens	30	Faced sheet steel panel	Gov.Bld.Dept	
			40	Faced sheet steel panel	BELCA	
		Suspended shelves	20	Faced sheet steel panel	BELCA	
		Sinks	(30)	Terrazo block panel	Gov.Bld.Dept	From documents calculating refurbishment costs for government buildings.
			20		BELCA	
		FRP bathtubs	15		Gov.Bld.Dept	
		Stainless steel bathtubs	25		Gov.Bld.Dept	
		Bath units	20		Kobayashi	From refurbishment costs for apartment complexes (equipment and management No.8804)
Electrical Equipment	High-pressure devices	High-voltage power input equipment	25		AIJ	
			25	Interior cubicles	Gov.Bld.Dept	
			25		Kobayashi	
			30	Interior cubicles	BELCA	
		High-voltage power I nput equipment	25	Exterior cubicles	Gov.Bld.Dept	
			20	Exterior cubicles	BELCA	
		Distribution board	25		AIJ	
			25		Gov.Bld.Dept	
			25		Kobayashi	
			30		BELCA	
		Transformer	25		AIJ	
			30		Gov.Bld.Dept	
			25		Kobayashi	
			30		BELCA	Interior
			30		Kuboi	
		Condenser	20		AIJ	
			20		Kobayashi	
			25		BELCA	
			25		Kuboi	
		Breaker	20		Kuboi	
			25		BCS	
	Home electrical	Private generators (Diesel-engined)	30	For emergency use	AIJ	25 years for the engine
			30		Gov.Bld.Dept	

Classification		By construction type	Service life	Specifications etc.	Source	Notes
	appliances equipment		30	For emergency use	Kobayashi	
			30	For emergency use	BELCA	
			20	For emergency use	Kuboi	
	DC power supply devices	Storage batteries (lead)	10		AIJ	
			7	Sealed lead (HS]	Gov.Bld.Dept	
			10		Kobayashi	
			7	Sealed lead (HS]	BELCA	
			7		Kuboi	
			13	Sealed lead (HS]	BCS	
		Storage batteries (alkaline)	25	Sealed, AHH	Gov.Bld.Dept	
			15	Pocket alkaline	BELCA	
			15		Kuboi	
			15	Pocket alkaline	BCS	
	Boards	Power control board	25		AIJ	
			25		Gov.Bld.Dept	
			25		Kobayashi	
			30		BELCA	
			20		Kuboi	
		Lighting distribution board	25		Gov.Bld.Dept	
			30		BELCA	
		Terminal board	30		Gov.Bld.Dept	
			60		BELCA	
	Lighting fixtures	Fluorescent light fixtures	10		AIJ	
			20		Gov.Bld.Dept.	
			10		Kobayashi	
			30		BELCA	
		Incandescent light fixtures	15		AIJ	
			20		Gov.Bld.Dept.	
			15		Kobayashi	
			30		BELCA	
		Guide lamps	20		Gov.Bld.Dept.	
			30		BELCA	
	Light electrical appliances	Telephone switchboard	15	Electronic pushbutton telephone	Gov.Bld.Dept.	
			30		BELCA	
		Amplifier	17		AIJ	
			20	Rack type	Gov.Bld.Dept.	
			25	Rack type	BELCA	Broadcasting amplifier
		Speakers	18		AIJ	
			20	Embedded in ceiling	Gov.Bld.Dept.	
			25	Embedded in ceiling	BELCA	
		Intercom	20	Base unit	AIJ	
			20	Base unit	Kobayashi	
			20	Base and satellite system	Gov.Bld.Dept.	
			20	Base and satellite system	BELCA	
		Electric clocks	20	Base unit	AIJ	
			20	Base and satellite system	Gov.Bld.Dept.	
			20	Base and satellite system	Kobayashi	
			25	Base and satellite system	BELCA	
			15	Base and satellite system	Kuboi	
		TV antennae	10		Gov.Bld.Dept.	20 years for masts
			15	With mast	BELCA	
		TV amplifiers	20		Gov.Bld.Dept.	

Classification		By construction type	Service life	Specifications etc.	Source	Notes
			15		BELCA	
		Mergers and splitters	20		Gov.Bld.Dept.	
			20		BELCA	
	Automatic fire detection equipment	Sensors	20	Distributed	AIJ	
			20	Differential type	Gov.Bld.Dept.	
			20	Differential type	Kobayashi	
			20	Differential type	BELCA	
		Receivers	20	Distributed	AIJ	
			20	50L	Gov.Bld.Dept.	
			20		Kobayashi	
			20	P-1 grade, 50L	BELCA	
	Wiring appliances	Switches	5		AIJ	
			(30)	Tumbler switch	Gov.Bld.Dept.	From documents calculating refurbishment costs for government buildings
			6		Kobayashi	
			20	With P	BELCA	
			17		BCS	
		Sockets	6		AIJ	
			(30)		Gov.Bld.Dept.	From documents calculating refurbishment costs for government buildings
			6		Kobayashi	
			20	With P	BELCA	
			16		BCS	
	Wiring and plumbing	Electrical wiring	20		AIJ	
			30		Gov.Bld.Dept.	
			20		Kobayashi	
			40	With P	BELCA	
		Pipes	20		AIJ	
			65	Thin steel cable duct	Gov.Bld.Dept.	
			20		Kobayashi	
			60	Thin steel cable duct	BELCA	
		Cable racks	65	Steel	Gov.Bld.Dept.	
			60	Steel	BELCA	
Mechanical Equipment	Heating and cooling sources equipment	Steel plate boilers	25		AIJ	
			15		Gov.Bld.Dept.	
			15		BELCA	
			15		BCS	
		Cast iron boilers	30	Steam	Gov.Bld.Dept.	
			10	Sectional boiler	Kobayashi	
			25	Steam	BELCA	
			20		Kuboi	
			21.1	Sectional boiler	BCS	
		Smoke tube boilers	20		Gov.Bld.Dept.	
			15		Kuboi	
			18.9		BCS	
		Turbo chillers	20		Gov.Bld.Dept.	
			25		Kobayashi	
			20		BELCA	
			20		Kuboi	
			21.1		BCS	
		Reciprocating chillers	15		Gov.Bld.Dept.	
			15		BELCA	
			15		Kuboi	
			15		BCS	
		Absorption chillers	20		Gov.Bld.Dept.	
			20		BELCA	
			15		Kuboi	
			17.5		BCS	
		Hot air heating	15		Gov.Bld.Dept.	

Classification		By construction type	Service life	Specifications etc.	Source	Notes
		pump chillers	15		BELCA	
		Cooling tower	13	FRP counterflow	Gov.Bld.Dept.	
			20		Kobayashi	
			15	FRP	BELCA	
			13	FRP	Kuboi	
			14.4		BCS	
	Air conditioning equipment	Compressed air handling unit	20		Gov.Bld.Dept.	
			15		Kobayashi	
			15		BELCA	
			18		Kuboi	
			17.5		BCS	
		Packaged air conditioning system (water-cooled type)	20		Gov.Bld.Dept.	
			15		BELCA	
			15	Semi-sealed	Kuboi	
			13.4		BCS	
		Packaged air conditioning system (hot air heat pump)	15		Gov.Bld.Dept.	
			15		BELCA	
	Heating and cooling units	Fan coil unit	20		Gov.Bld.Dept.	
			20		Kobayashi	
			15	Exposed, floor mounted	BELCA	
			18		Kuboi	
			15.8		BCS	
		Fan convector	20		Gov.Bld.Dept.	
			15	Exposed, floor mounted	BELCA	
			13.6		BCS	
		Cast-iron radiator	30		AIJ	
			20.8		BCS	
	Total enthalpy heat exchanger	Total enthalpy heat exchanger	20	Rotating	Gov.Bld.Dept.	
			15	Rotating	BELCA	
		Heat exchanger unit	20	Embedded in ceiling	Gov.Bld.Dept.	
			15	Embedded in ceiling	BELCA	
	Air supply and venting equipment	Blower	20		AIJ	
			20	Centrifugal	Gov.Bld.Dept.	
			20		Kobayashi	
			20	Forward curved fan	BELCA	
			18		Kuboi	
			18.6	Sirocco fan	BCS	
		Smoke extractor	25		Gov.Bld.Dept.	
			25	Forward curved fan	BELCA	
	Pumps	Lifting pump	15	Turbine pump	AIJ	20 years for the motor
			20		Gov.Bld.Dept.	
			15	Turbine pump	Kobayashi	20 years for the motor
			15	Multi-level	BELCA	
			15		Kuboi	
			17	Sirocco fan	BCS	
		Hot and cold water pump	20		Gov.Bld.Dept.	
			15		BELCA	
			17		BCS	
		Hot water supply and recirculating pump	15		AIJ	20 years for the motor
			20		Gov.Bld.Dept.	
			15		Kobayashi	20 years for the motor
			15	Line pump	BELCA	
		Cooling water pump	20		Gov.Bld.Dept.	
			15	Volute	BELCA	
		Misc. waste water pump	15		AIJ	20 years for the motor
			15		Gov.Bld.Dept.	
			15		Kobayashi	20 years for the motor

Classification		By construction type	Service life	Specifications etc.	Source	Notes
			10	Submerged	BELCA	
			15	Submerged	Kuboi	
			12.9	Submerged	BCS	
		Fire extinguishing pump	27	Turbine	AIJ	20 years for the motor, 25 for the engine
			20	Unit-type	Gov.Bld.Dept.	
			27		Kobayashi	20 years for the motor, 25 for the engine
			27	Unit-type	BELCA	
	Water tanks	Water intake tanks, elevated water tanks (made of steel plate)	20		AIJ	
			20	Panel-type	Gov.Bld.Dept.	
		Water intake tanks, elevated water tanks (made of FRP)	25	Panel-type	Gov.Bld.Dept.	
			20		Kobayashi	
			20	Panel-type	BELCA	
		Water intake tanks, elevated water tanks (made of stainless steel)	30	Panel-type	Gov.Bld.Dept.	
			20	Panel-type	BELCA	
	Tanks	Oil tanks	30		Gov.Bld.Dept.	
		(Underground)	25		BELCA	
		Hot water tank (made of steel plate)	15		AIJ	
			20		Gov.Bld.Dept.	
			15		Kobayashi	
			15		BELCA	
			17.1		BCS	
		Hot water tank (made of stainless steel)	25		Gov.Bld.Dept.	
			15		BELCA	
			18.7		BCS	
	Pipes	Carbon steel pipes (white) (water supply)	20		AIJ	
			20		Kobayashi	
			18.1		BCS	
		Carbon steel pipes (white) (Water supply)	18		AIJ	
			18		Kobayashi	
			12		BELCA	
			14.9		BCS	
		Carbon steel pipes (white) (water drainage and ventilation)	18		AIJ	
			30		Gov.Bld.Dept.	
			18		Kobayashi	
			20		BELCA	
			18.4		BCS	
		Carbon steel pipes (white) (firefighting)	20		AIJ	
			30		Gov.Bld.Dept.	
			25		Kobayashi	
			25		BELCA	
		Carbon steel pipes (white) (coolant water)	20		Gov.Bld.Dept.	
			20		BELCA	
			18		BCS	
		Carbon steel pipes (black) (steam)	15		AIJ	
			20		Gov.Bld.Dept.	
			20		BELCA	
			17.8		BCS	
		PVC-lined steel pipes (water supply)	25		Gov.Bld.Dept.	
			30		BELCA	
		Copper pipes (hot water)	30	M	Gov.Bld.Dept.	
			15	M	BELCA	
			18.3		BCS	
		Copper pipes (coolant)	30	L	Gov.Bld.Dept.	
			30	L	BELCA	
		Stainless steel pipes (cold and hot water supply)	30		Gov.Bld.Dept.	
			30		BELCA	
		Vinyl pipes (water supply)	20	HIVP	Gov.Bld.Dept.	

Classification		By construction type	Service life	Specifications etc.	Source	Notes
			30	HIVP	BELCA	
		Vinyl pipes (water drainage)	30	VP	Gov.Bld.Dept.	
			25	VP	BELCA	
		Cast iron pipes (drainage)	28		AIJ	
			40		Gov.Bld.Dept.	
			28		Kobayashi	
			30		BELCA	
		Fume pipes (water drainage)	28		AIJ	
			40		Gov.Bld.Dept.	
			30		BELCA	
	Air ducts	Air conditioning ducts	20		AIJ	
			30		Gov.Bld.Dept.	
			20		Kobayashi	
			30		BELCA	
		Pan-type air vent	30		Gov.Bld.Dept.	
			20		BELCA	
		Universal-type air vents	30		Gov.Bld.Dept.	
			20	VHS	BELCA	
	Water boilers	Gas water heaters	10		Gov.Bld.Dept.	
			10		BELCA	
			8.2		BCS	
		Electric water heaters	10		Gov.Bld.Dept.	
			10		BELCA	
	Fire extinguishers	Indoor fire hydrants	30		Gov.Bld.Dept.	
			20		BELCA	
		Siamese connection	30		Gov.Bld.Dept.	
			20		BELCA	
		Halogen fire extinguisher spray head	20		Gov.Bld.Dept.	
			25		BELCA	
		Halogen fire extinguisher trigger system	20		Gov.Bld.Dept.	
			25		BELCA	
	Hygienic equipment	Toilet bowl	25	Japanese-style	AIJ	
			30	Japanese-style	Gov.Bld.Dept.	
			25	Japanese-style	Kobayashi	
			25	Japanese-style	BELCA	
		Urinal	30		AIJ	
			30		Gov.Bld.Dept.	
			30		Kobayashi	
			30		BELCA	
		Wash basins	25		AIJ	
			30		Gov.Bld.Dept.	
			25		Kobayashi	
			25		BELCA	
		Vanity wash basin	15		Gov.Bld.Dept.	
		Faucets	15		Gov.Bld.Dept.	
			20		BELCA	
	Amc control equipment	Sensors	15	Electronic, temperature	Gov.Bld.Dept.	
			10	Electronic, temperature	BELCA	
		Regulators	15	Electronic, temperature	Gov.Bld.Dept.	
			10	Electronic, temperature	BELCA	
		Controllers	12	Electronic	Gov.Bld.Dept.	
			10	Electronic	BELCA	
		Control panels	10		Gov.Bld.Dept.	
		Central monitoring board	10		Gov.Bld.Dept.	
Elevators	Elevators	Elevators	20		AIJ	
			30	General	Gov.Bld.Dept.	
			20		Kobayashi	
			25		Kuboi	
			25	Standard type	BELCA	

I. Sources for data contained in the service life table

The data contained in the service life table mainly derives from the sources below, as stated in the standard names. Other sources are as stated in the Notes column.

1.ALJ: "The standard of repair methods" - Study on maintenance and conservation of fireproof buildings - Research Committee on Building Economics, Architectural Institute of Japan.

2.Cov.Bld.Dept.:

a) "Lifecycle Costing of Buildings," Economic Research Association, the service life value with() referred from b) below,

b) "Repair intervals and repair rate by building part, "Documents on costing method for repair of government buildings, March 1981, Government building Department, former Ministry of Construction.

3.NTT: a)"Standard values of repair intervals of repair rate (reference)"Guide for repair of buildings(Technical paper),Building Department, Nippon Telegraph and Telephone Public Corporation.

4.Kobayashi: a)"Standard values of repair intervals and repair rate (reference)"Guide for repair of buildings(Technical paper), Building Department, Nippon Telegraph and Telephone Public Corporation.

5.BELCA:"Building's LC Assessment database," Building and Equipment Life Cycle Association.

6.Kuboi:Typical values for service lives (for preventative maintenance purpose)extracted from "Service life of Machines and Equipments" by Keiji Kuboi, Building Conservation vol.2, Maintenance and management of electrical equipments.

7.BCS:"Reserch report on practical service lives of machines and equipments, "Sub-committee on Durability of building service system, Committee on building service, Building Constructors Society.

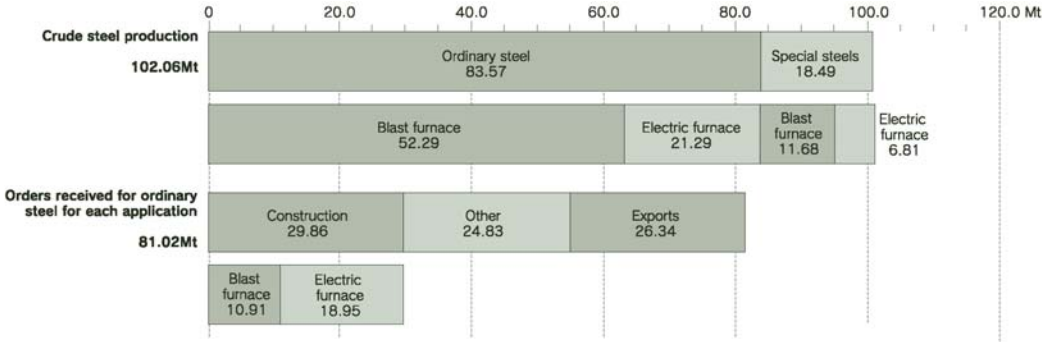
Source of the table: "Survey report on Service lives of Building Structural Elements, Components and other Elements," Building and Equipment Life Cycle Association, 1988.

2. Steel H section dimensions that can be provided by multiple electric furnace steel manufacturers

Nominal size (m/m)	HXB
100× 50	100× 50
100× 100	100×100
125× 60	125× 60
125×125	125×125
150× 75	150× 75
150×100	148×100
150×150	150×150
175× 90	175× 90
175×175	175×175
200×100	198× 99
	200×100
200×150	194×150
200×200	200×200
	200×204
250×125	248×124
	250×125
250×175	244×175
250×250	250×250
	250×255
300×150	298×149
	300×150
300×200	294×200
300×300	294×302
	300×300
	300×305

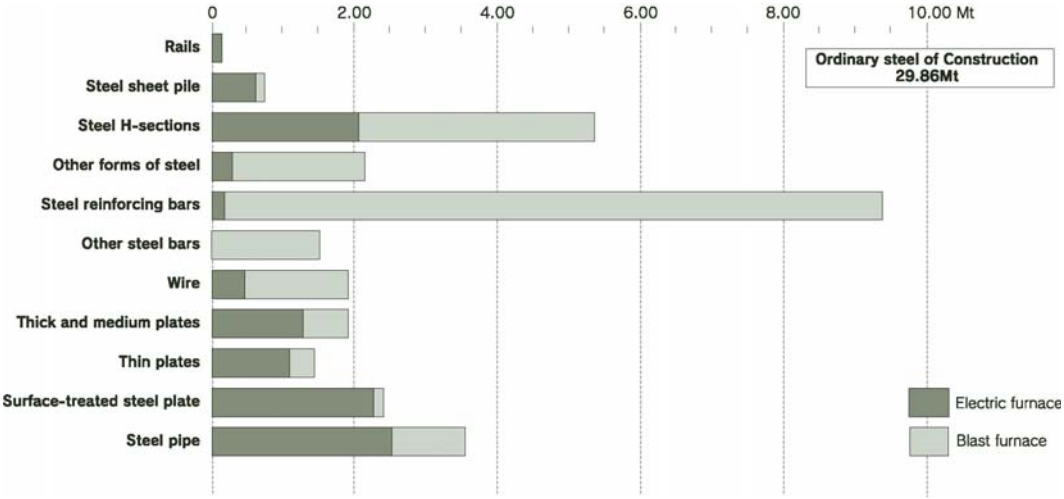
Nominal size (m/m)	HXB
350×175	346×174
	350×175
350×250	340×250
350×350	344×354
	350×350
	350×357
400×200	396×199
	400×200
400×300	390×300
400×400	400×400
450×200	446×199
	450×200
450×300	440×300
500×200	496×199
	500×200
	506×201
500×300	482×300
	488×300
600×200	596×199
	600×200
	606×201
600×300	582×300
	588×300
	594×302
700×300	692×300
	700×300

3. Breakdown of Japan's total steel production and orders of normal steel (FY 2001)



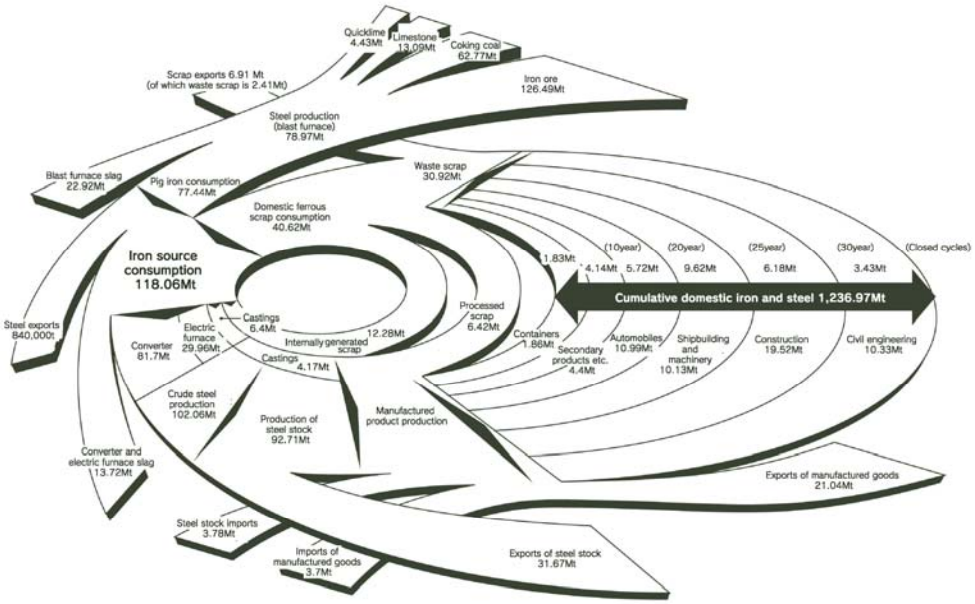
* Prepared from the Japan Iron and Steel Federation "Handbook for Iron and Steel Statistics."
* Figures in parentheses ( ) are estimated by the Construction and Environmental Committee of the Japan Iron and Steel Foundation.

4. Breakdown of orders for each type of construction steel (FY 2001)



* Estimated by the Construction and Environmental Committee of the Japan Iron and Steel Foundation.

5. Diagram of iron and steel circulation in Japan (FY 2001)



* Prepared by the Construction and Environmental Committee of the Japan Iron and Steel Federation.

■Bibliography 33), 34)

PARTⅢ. An Overview of CASBEE

1. Measures to Promote Sustainability

Again, construction, which consumes and discards resources and energy in enormous quantities, is one field where we must act urgently to develop and promote techniques and policies able to assist the drive towards sustainability.

There has been a growing movement towards sustainable construction since the second half of the 1980s, leading to the development of various methods for evaluating the environmental performance of buildings. Methods developed overseas include BREEAM (Building Research Establishment Environmental Assessment Method*[14]) in the UK, LEED™ (Leadership in Energy and Environment Design*[15]) in the USA, and GB Tool (Green Building Tool*[16]) as an international project. These methods have attracted interest around the world. This kind of assessment, with the publication of the results, is one of the best methods now available to provide an incentive for clients, owners, designers and users to develop and promote highly sustainable construction practices.

CASBEE was developed according to the following policies:

1) The system should be structured to award high assessments to superior buildings, thereby enhancing incentives to designers and others.
2) The assessment system should be as simple as possible.
3) The system should be applicable to buildings in a wide range of applications.
4) The system should take into consideration issues and problems peculiar to Japan and Asia.

2. Framework of CASBEE: CASBEE Family

2.1 Building Lifecycle and Four Assessment Tools

As shown in figure 2.1, CASBEE was developed in the suite of architectural design process*[17], starting from the pre-design stage and continuing through design and post design stages.

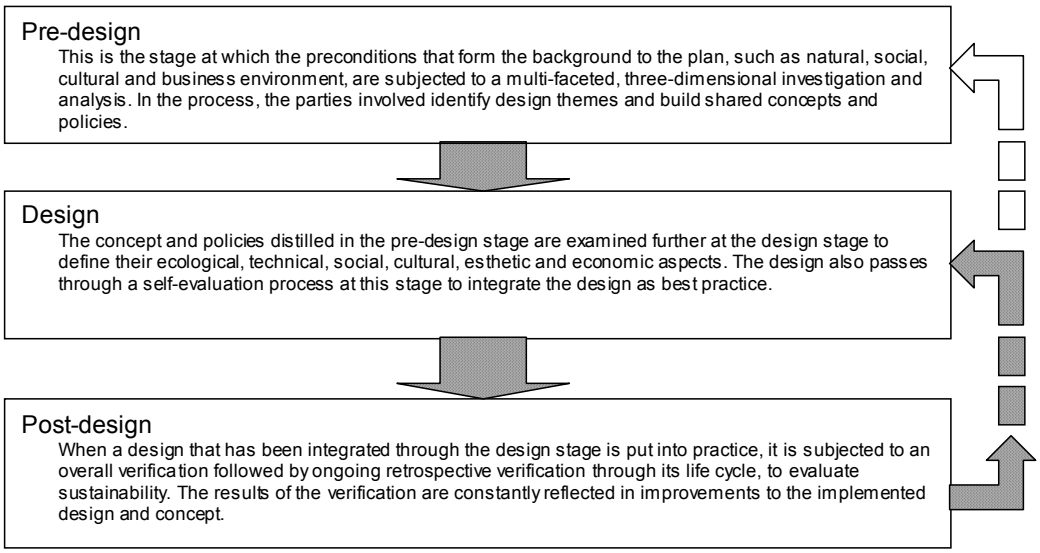
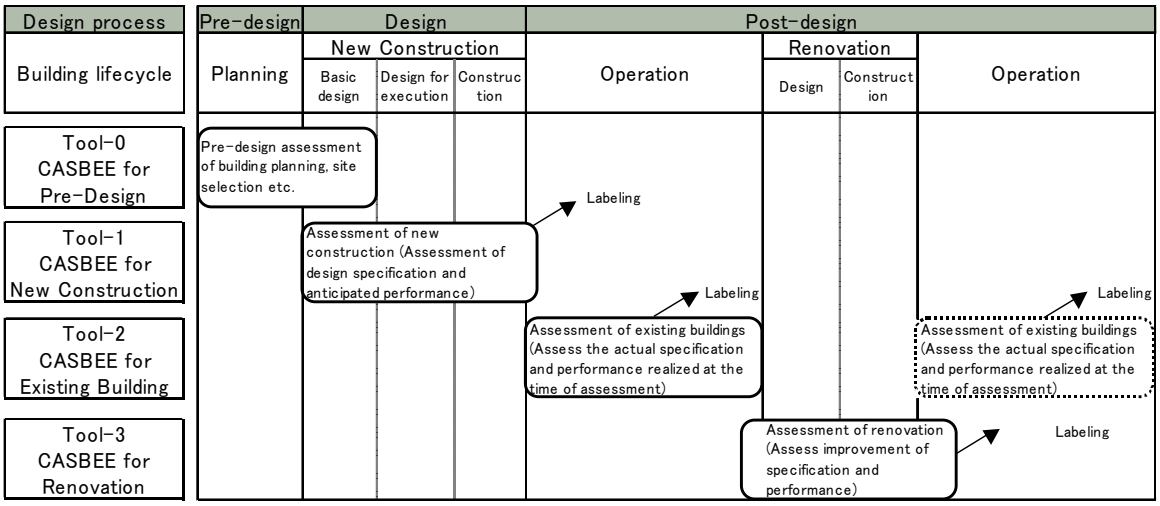


Figure 2.1 The cyclical process of building design

CASBEE is composed of four assessment tools corresponding to the building lifecycle. “CASBEE Family” is the

[14] Building Research Establishment (UK), 1990
[15] US Green Building Council, 1997
[16] “Green Building Challenge” National Resource Canada, 1998
[17] Architectural Institute of Japan, Sub Committee on National and International Trend Research and Proposal to Promote Sustainable Buildings, 2001

collective name for these four tools and the expanded tools for specific purposes, which are listed below. The CASBEE assessment tools are CASBEE for Pre-design, CASBEE for New Construction, CASBEE for Existing Building and CASBEE for Renovation, to serve at each stage of the design process. Each tool is intended for a separate purpose and target user, and is designed to accommodate a wide range of uses (offices, schools, apartments, etc.) in the evaluated buildings.



Names of the four basic tools

Names	Abbreviation	Tool #
CASBEE for Pre-design	CASBEE-PD	Tool-0
CASBEE for New Construction	CASBEE-NC	Tool-1
CASBEE for Existing Building	CASBEE-EB	Tool-2
CASBEE for Renovation	CASBEE-RN	Tool-3

Figure 2.2 Building Lifecycle and Four Assessment Tools

CASBEE for Pre-design

This tool aims to assist the owner, planner and others involved at the planning (pre-design) stage of the project. It has two main roles:

1) To assist in grasping issues such as the basic environmental impact of the project and selecting a suitable site.

2) To evaluate the environmental performance of the project at the Pre-design stage.

CASBEE for New Construction*

This is a self-assessment check system that allows architects and engineers to raise the BEE value of the building under consideration during its design process. It makes assessments based on the design specification and the anticipated performance. It can also serve as a labeling tool when the building is subjected to expert third-party assessment. Remodeling and replacement construction are evaluated under “CASBEE for New Construction.”

*Former name：Design for Environment (DfE) Tool

CASBEE for Existing Building

This assessment tool targets existing building stock, based on operation records for at least one year after completion. It was developed to be applicable to asset assessment as well.

CASBEE for Renovation

There is growing demand for building stock renovation, especially in Japanese market. In the same way as “CASBEE for Existing Building,” this tool targets existing buildings. It can be used to generate proposals for building operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects, which will be increasingly important in future, and for building stock renovation. This tool is designed for ascertaining the degree of improvement (increased BEE), relative to the level that preceded renovation. Labeling is also possible by third-party agencies.

2.2 CASBEE for Specific Purposes

The basic CASBEE tool suite is applicable to a diverse range of individual applications.

(1) Application to buildings for short-term use

The tool "CASBEE for Temporary Construction (exhibition facilities)," published in July 2004, was developed as an extension to CASBEE for New Construction for evaluating temporary buildings constructed specifically for short-term use, such as Expo pavilions. Buildings of this type have short-term lifecycles, and therefore consideration must concentrate largely on material use and recycling in the construction and demolition phases. Also, these buildings have simple equipment and interior and exterior finishes. The scoring criteria reflect those features of this type of buildings. So far, the tool has been completed in a version limited to exhibition facilities.

The current version of CASBEE for Temporary Construction (exhibition facilities) targets buildings that have lifetime within 5 years. Scoring criteria are based on those for halls of CASBEE-NC, and some modifications are made as follows;

1) The scoring criteria of Q-1 Indoor environment is lowered for background noise, because simple exterior materials with poor performance in sound insulation are often installed in temporally buildings.
2) "Durability & Reliability" and "Flexibility & Adaptability" in Q-2 Quality of service are excluded from scoring criteria.
3) In LR-2 Resource & Materials, "3R (reuse, reduction and recycling) of building materials" and "Minimization of waste disposal" are evaluated as additional assessment items.
4) Weightings are altered to reflect the importance of resource recycle and waste reduction in this assessment system. LR-2 gains heavier weight, and lighter weight is allocated for LR-1 Energy and Q-2 Quality of Service.

(2) Simple assessment

Assessment using CASBEE for New Construction may take 3~7 days, including the time required to prepare documents necessary as the basis for scoring. CASBEE for New Construction (Simplified) was developed to meet the growing need for a tool to handle objectives such as those below. It makes a simplified, provisional assessment possible in around two hours (excluding time for the preparation of an Energy Saving Plan).

1) The need for simplified setting of the Building Environmental Efficiency level (as a tool for consensus forming between owners, designers and builders, etc.).
2) The need for setting environmental design targets and assessing attainment (as a proposal management tool etc. under ISO14001).
3) The need for preparation of documents for submission to government agencies, etc. (Environmental measures under construction administration, such as CASBEE Nagoya and CASBEE Osaka).

(3) Consideration for regional character

As noted above, CASBEE for New Construction (Simplified) can be used by local authorities in construction administration. Local authorities that use this tool can tailor it to local conditions, such as climate and prioritized policies. Changes are generally made by modifying the weighting coefficients. Such assessment can be made mandatory in the same way as an Energy Saving Plan, to be submitted to the authorities together with the building approval application, as a way to improve the environmental efficiency of buildings in the region. Flexible response to regional character is a common feature of all elements of the CASBEE family.

One example is "CASBEE Nagoya." CASBEE Nagoya has its own scoring guidelines that instruct some criteria in relation to local contexts, such as materials from local industry, and that define some excluding criteria. After CASBEE Nagoya began on April 1, 2004, the city received about 30 reports as of the end of July, and most of those buildings were labeled as class "B-" or "B+." Also almost no confusion was reported to the municipality over the operation of the system (Noda, 2004). It shows that the system effectively works for local application, so far.

Another example is CASBEE Osaka that altered weighting coefficient from the original to reflect the high priority they give to heat island policy. The city of Osaka also started administrative use of CASBEE from October 1, 2004, changed the weights of Q-1 Indoor environment from 0.4 to 0.3 and Q-3 Outdoor environment on site from 0.3 to 0.4.

(4) Detailed assessment of heat island impact

Assessment of the heat island effect is essential in major urban areas, such as Tokyo and Osaka. CASBEE-H (draft completed in June 2004) was developed to assess efforts in buildings to alleviate the heat island effect. Its role is to make a more detailed and quantitative assessment of the heat island-related assessment items included in the basic tools.

(5) Extended tool for regional scale assessment

CASBEE considers individual buildings, but it fully recognizes the importance of assessing building groups. Many recent city-center redevelopment projects have included plans taking into account the urban surroundings as one unit. For example, provision of public spaces on the site can be expected to have a positive effect on the surrounding environment, thereby improving environmental quality and performance (Q). Common restrictions imposed on all buildings on a site, even if each one has a different owner, can be regarded as efforts to improve the environmental performance of the urban area as a whole. Study has started on an extended CASBEE tool called “CASBEE for District/Regions” (provisional name) that will broaden assessment to cover efforts applied through either city-center renewal of urban districts, or development of large areas including multiple buildings.

Table 2.1 Expansion of CASBEE for specific purposes (as of April 2004)

Basic tool	Application	Name	Outline
CASBEE for New Construction	Temporary	CASBEE for Temporary Construction	Currently adapted to exhibition facilities.
	Simple preliminary assessment	CASBEE for New Construction (simplified)	Simplified edition of CASBEE for New Construction.
	For individual areas	—	CASBEE for New Construction (Simplified), tailored to regional characteristics
	Assessment on the efforts in alleviating the heat island phenomenon	CASBEE-H	Detailed assessment of the heat island effect using CASBEE

3. The Background to CASBEE Development

3.1 Past development of environmental performance assessment

3.1.1 Stage 1

The oldest form of environmental assessment of buildings in Japan is the performance assessment of building environments, mainly indoor environments, which is basically aimed at improving living amenities or enhancing convenience for occupants. This can be thought of as Stage 1 in the evolution of the environmental assessment of buildings. At this stage, since the local environment surrounding the building concerned and the global environment were generally considered as open systems, environmental assessments paid no attention to the fact that buildings simply discharged their environmental loadings into their surroundings. In this sense, the philosophy behind environmental assessments was very clear, but opposite to today’s approach.

3.1.2 Stage 2

The growth of public concern over air pollution problems or the effects of wind on pedestrians etc. in urban areas such as Tokyo in the 1960s led to the establishment of environmental impact assessments. This was the time when the concept of environmental loadings was initiated and incorporated into building environmental assessments, and this is thought of as Stage 2. Here, only the negative effects that buildings have on their surrounding environments, such as urban air pollution, wind damage, and daylight obstruction etc., are considered as environmental impacts, i.e. environmental loads. In Stage 1, the environment usually suggests a private space or property, whereas in Stage 2 it is a public (or non-private) space.

3.1.3 Stage 3

Stage 3 in the evolution of the environmental assessment of buildings began after the increase in the consciousness of global environmental problems in the 1990's. A number of specific methods have already been proposed, based on extensive research experience, including BREEAM, LEED™ and GB Tool. In recent years, building environmental performance assessment methods such as these have spread rapidly in society, particularly in developed countries, and they have also come to be used for "Design for Environment" and building environmental labeling (rating). The main issue in assessment at this stage is the negative

impacts; in other words, the environmental loadings that the buildings have on the environment. That is to say, it considers Life Cycle Assessment (LCA), evaluating the environmental loads of a building throughout its life. In addition, building performance was also included as an object in some assessments, as in Stage 1. Notably, none of the above assessment tools clearly distinguish between these two basic assessment objects (in Stage 1 and Stage 2). Also, the scope (or boundary) of the assessment objects is not clearly stated. In this sense, the concept of environmental assessment in Stage 3 lacks the clear underlying philosophy found in Stage 1 and Stage 2, while the framework of assessment has expanded in Stage 3. The assessment framework, relative to the first and second stages, but conversely, the framework of assumptions on which the environmental performance evaluation is based has become unclear.

3.2 Stage 4: New Stage in the Environmental Assessment of Buildings

Development of CASBEE started from perception that the above situation required a reconstruction of the current environmental performance assessment framework into a new system clearly based on the perspective of sustainability. Stage 3 in environmental assessment began when it was recognized that the capacities of local environments, and the world as a whole, were reaching a limit. As a result, the concept of closed ecosystems became essential for determining environmental capacities when conducting environmental assessments. Therefore a hypothetical enclosed space bounded by the borders of the building site, as shown in Figure 2.3, is proposed here in making environmental assessments of buildings. The environmental loadings can thus be defined as "the negative environmental impact that extends outside to the public environment beyond the hypothetical enclosed space." The improvement of environmental performance within the hypothetical enclosed space is defined as "the improvement in living amenities for building users." Dealing with both factors, the stage 4 environmental assessment clearly defines these two factors, and distinguishes one from the other as defined by BEE in Equation 1 of the following section. This makes the philosophy of assessment at stage 4 much clearer, and it has been used to form the framework for CASBEE, and it is the basis of the CASBEE framework.

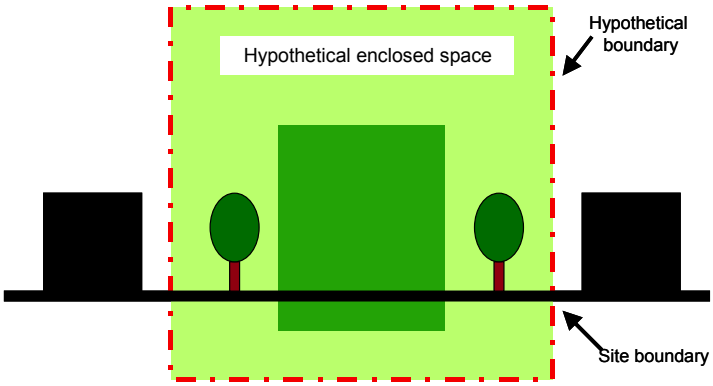


Figure 2.3 Hypothetical enclosed space divided by the site boundary

3.3 From Eco-efficiency to Building Environmental Efficiency (BEE)

The concept of Eco-efficiency has been introduced for CASBEE to enable the integrated assessment of two factors, inside and outside the building site. Eco-Efficiency is normally defined as "Value of products and services per unit environmental load."*[18] Efficiency is commonly defined in terms of input and output quantities, so a new model can be proposed for an expanded definition of Eco-Efficiency, as "(beneficial output)/ (input + non-beneficial output)." As figure 2.4 shows, this new model of environmental efficiency can be extended to define Building Environmental Efficiency (BEE), which CASBEE uses as its assessment indicator.

[18] From the World Business Council for Sustainable Development (WBCSD)

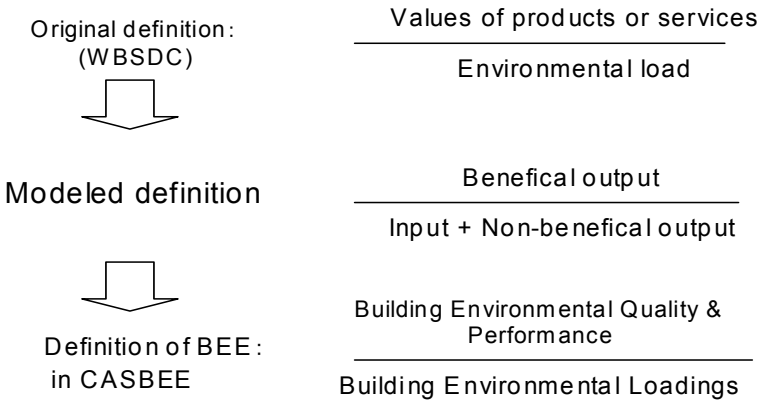


Figure 2.4 Development from the Eco-efficiency concept to BEE

4. The Assessment Method Employed by CASBEE

4.1 Two Categories of Assessment: Q and L

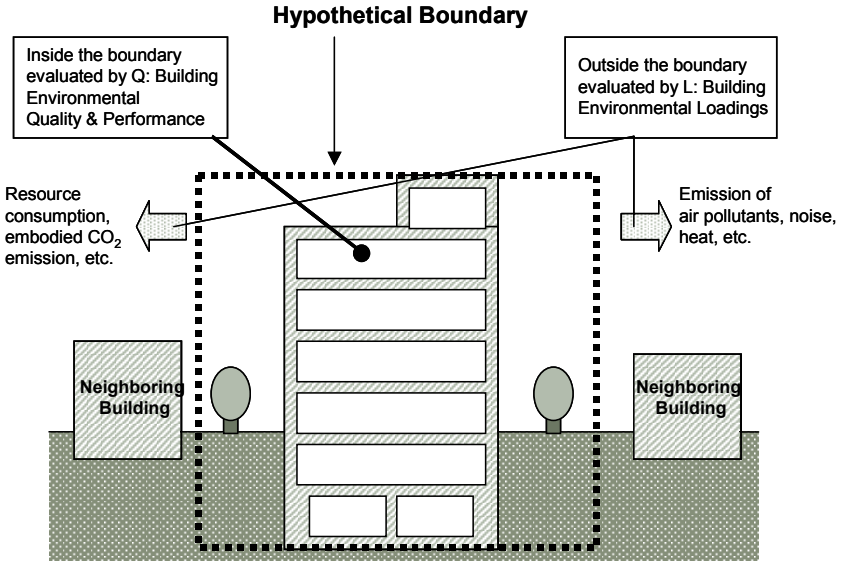
Under CASBEE there are two spaces, internal and external, divided by the hypothetical boundary, which is defined by the site boundary and other elements, with two factors related to the two spaces. Thus we have put forward CASBEE in which the "negative aspects of environmental impact which go beyond the hypothetical l enclosed space to the outside (the public property)" and "improving living amenity for the building users" are considered side by side. Under CASBEE, these two factors are defined below as Q and L, the main assessment categories, and evaluated separately.

·Q (Quality): Building Environmental Quality & Performance:

Evaluates "improvement in living amenity for the building users, within the hypothetical enclosed space (the private property)."

·L (Loadings): Building Environmental Loadings:

Evaluates "negative aspects of environmental impact which go beyond the hypothetical enclosed space to the outside (the public property)."



4.2 Four Target Fields of CASBEE and Its Rearrangement

CASBEE covers the following four assessment fields: (1) Energy efficiency (2) Resource efficiency (3) Local environment (4) Indoor environment These four fields are largely the same as the target fields for the existing assessment tools described above in Japan and abroad, but they do not necessarily represent the same concepts, so it is difficult to deal with them on the same basis. Therefore the assessment categories contained within these four fields had to be examined and reorganized. As a result, the assessment categories were classified as shown in Figure 4.2 into BEE numerator Q (Building environmental quality and performance) and BEE denominator L (Reduction of building environmental loadings). Q is further divided into three items for assessment: Q1 Indoor environment, Q2 Quality of services and Q3 Outdoor environment on site. Similarly, L is divided into L1 Energy, L2 Resources & Materials and L3 Off-site Environment.

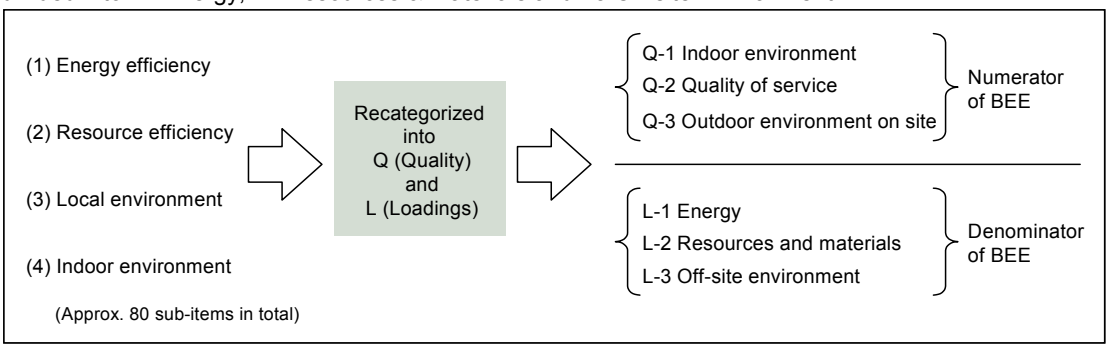


Figure 4.2 Classification and rearrangement of assessment items into Q (Building environmental quality and performance) and L (Building environmental loadings)

4.3 Environmental Labeling Using Building Environmental Efficiency (BEE)

As explained above, BEE (Building Environmental Efficiency), using Q and L as the two assessment categories, is the core concept of CASBEE. BEE, as used here, is an indicator calculated from Q (building environmental quality and performance) as the numerator and L (building environmental loadings) as the denominator.

$$\text{Building Environmental Efficiency (BEE)} = \frac{\text{Q (Building environmental quality and performance)}}{\text{L (building environmental loadings)}}$$

The use of BEE enabled simpler and clearer presentation of building environmental performance assessment results. BEE values are represented on the graph by plotting L on the x axis and Q on the y axis. The BEE value assessment result is expressed as the gradient of the straight line passing through the origin (0,0). The higher the Q value and the lower the L value, the steeper the gradient and the more sustainable the building is. Using this approach, it becomes possible to graphically present the results of building environmental assessments using areas bounded by these gradients (Eco-labeling). The figure shows how the assessment results for buildings can be labeled on a diagram as class C (poor), class B-, class B+, class A, and class S (excellent), in order of increasing BEE value.

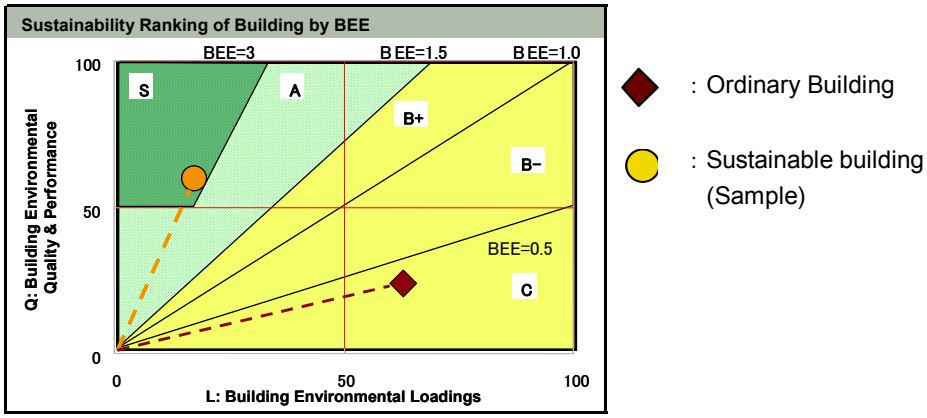


Figure 4.3 Environmental Labeling Based on Building Environmental Efficiency (BEE)

5. Basic Approach to Subjects for Assessment by CASBEE

CASBEE is a comprehensive tool focused on evaluating the environmental performance of buildings. Therefore it is not intended to evaluate all aspects of building performance and quality. In particular, specialized assessment systems already exist for fields such as aesthetic and economic performance, so they are excluded from consideration by CASBEE.

1) Aesthetic assessment

CASBEE emphasizes living amenity and working convenience for building users as the key aspects of the environmental quality and performance of buildings. Scenic consideration in matters such as building position, form and exterior materials, and efforts to adapt to regional character are considered here, but we have decided not to evaluate aesthetic design characteristics, such as building beauty, which are difficult to evaluate objectively.

2) Assessment of Cost and Profitability

CASBEE is intended to be an assessment tool applicable to a wide range of building applications in both the public and private sectors. As such we have decided that assessment of cost-effectiveness should be left for building owners to judge according to their individual business situations. The market value of the completed building, the profitability of business conducted in the building and other aspects less related to global environmental problems play a large part in the project client's judgement of how much to invest in improving a building's environmental performance.

CASBEE serves as an indicator for considering the “best balance of quality and the environment,” based on the assumption of broadly economic buildings, and its assessment items include social perspectives such as consideration for regional character.

6. Application of CASBEE

CASBEE, which has been developed as one such evaluation system, is intended to serve applications such as those listed below.

(1) For designers to employ in designing for the environment (DfE)

CASBEE can serve as an assessment tool that designers can use to check the environmental performance of buildings at the design stage and provide their clients and others with objective information on environmental considerations. It can also be used as an indicator for the indirect setting of targets that clients, designers and others can use to evaluate their own environmental management activities under ISO14001 and other systems.

(2) Environmental labeling that can be used in the asset valuation of buildings

CASBEE can be used by third-party agencies as an environmental performance assessment tool for labeling buildings when they are valued as assets.

(3) Environmental performance diagnosis and upgrade design with a view to ESCO projects and building stock refurbishment

CASBEE can be used as a tool to generate proposals for building operation monitoring, commissioning and upgrade design with a view to ESCO (Energy Service Company) projects and building stock refurbishment.

(4) Application to building administration

Under the Environmental Protection Ordinance (enacted December 2000), Metropolitan Tokyo obliges all building owners intending to newly build or remodel a building with floor area over 10,000m^2 to submit a planning document assessing the overall environmental efficiency of the building (but not using CASBEE) at least 30 days before the building approval application, and to submit a notification of completion within 15 days of the completion of construction. The content of these submissions is published on the Internet. This system began operating in June 2002. The city of Nagoya has been running its building environmental consideration system under the Environmental Conservation Ordinance. The threshold for application of the ordinance is reduced to 2,000m^2, and CASBEE Nagoya is used for the assessment. Osaka adopted guidelines in May 2004 for Osaka Municipal Comprehensive Assessment System for Building Environmental Efficiency (CASBEE Osaka), and the system has been implemented since October 2004. One condition for approval of buildings is that the rating under Comprehensive Assessment System for Building Environmental Efficiency, which reduces or increases floor-area ratios, should reach at least the third of CASBEE’s five grades (B+ class). Other regional public bodies are considering using CASBEE.

(5) Use in selection of design competition proposals, and PFI project operators

Tools such as the US LEED have already been used for public buildings ordered by states and cities, and their use is spreading to private sector building owners. Before long we expect to see such tools used in Japan for scoring design competition proposals, selecting PFI project operators and checking environmental performance at the design stage. Overall Environmental Efficiency Labeling for buildings can also be used between building clients and designer, or between owners and occupants, to determine environmental targets.

Overall Environmental Efficiency Labeling could be specified to designers as a design condition by private-sector project clients, as well as by local authorities, and designers could use it to raise their scores in pursuit of the maximum level of environmental performance that can be achieved within a given budget.

(6) Use as an international tool

The International Organization for Standardization (ISO) is also working towards an international standard method of environmental impact assessment for buildings, under TC59/SC17, but provided a system meets international standards, it should be usable internationally, in forms such as multinational certification of environment labels. For example, if a foreign company getting established in Japan wants to lease or buy a building, or if a Japanese company established a factory abroad, CASBEE should be fully applicable abroad, provided it meets the ISO standard as an assessment system. In China, the GOBAS system (Green Olympic Building Assessment System), which is applied to the design, construction and operation of sports facilities for the 2008 Beijing Olympics, was developed by a group at Tsinghua University under Professor Jiang and published in August 2003. It will not be long before a Comprehensive Environmental Efficiency Labeling system is used at international competitions in China and Asia, in which Japan has increasing chances to participate.

7. CASBEE Assessment Certification System and Assessor Registration System

7.1 Assessment Certification System

The applications for CASBEE were indicated above, but when the assessment results produced by CASBEE are provide to third parties, it becomes increasingly important to ensure their reliability and transparency. The assessment certification system is a system established to ensure reliability in information provided to third parties in order to confirm the accuracy of results generated by CASBEE, and thereby promote its proper and more widespread use. This is a system used to ensure the reliability of asset evaluation and labeling for assessed buildings by designers, owners and builders.

7.2 The Assessor Registration System

CASBEE is based on making assessment as quantitative as possible, but it includes assessment items that are qualitative in nature. As such, it requires a specialized engineer with expertise and knowledge in the comprehensive environmental performance evaluation of buildings. That is why the CASBEE Assessor Registration System was established. Those aiming to become assessors must attend an assessor training course, pass the assessor examination and complete registration. Students must be first-class builders (architects) to qualify to take the assessor examination. CASBEE Assessment certification system and the Assessor Registration System are implemented by the Institute for Building Environment and Energy Conservation.

Afterword

This research is part of the research output of the Japan Sustainable Building Consortium (chaired by professor Shuzo Murakami of Keio University), which has been established within the Institute for Building Environment and Energy Conservation through cooperation between industry, government and academia, with the support of Japanese Ministry of Land, Infrastructure and Transport, Housing Bureau. We expect the committee's out put to be widely used in future, to make and important contribution to building a sustainable society.

As of June 2004 (random order)

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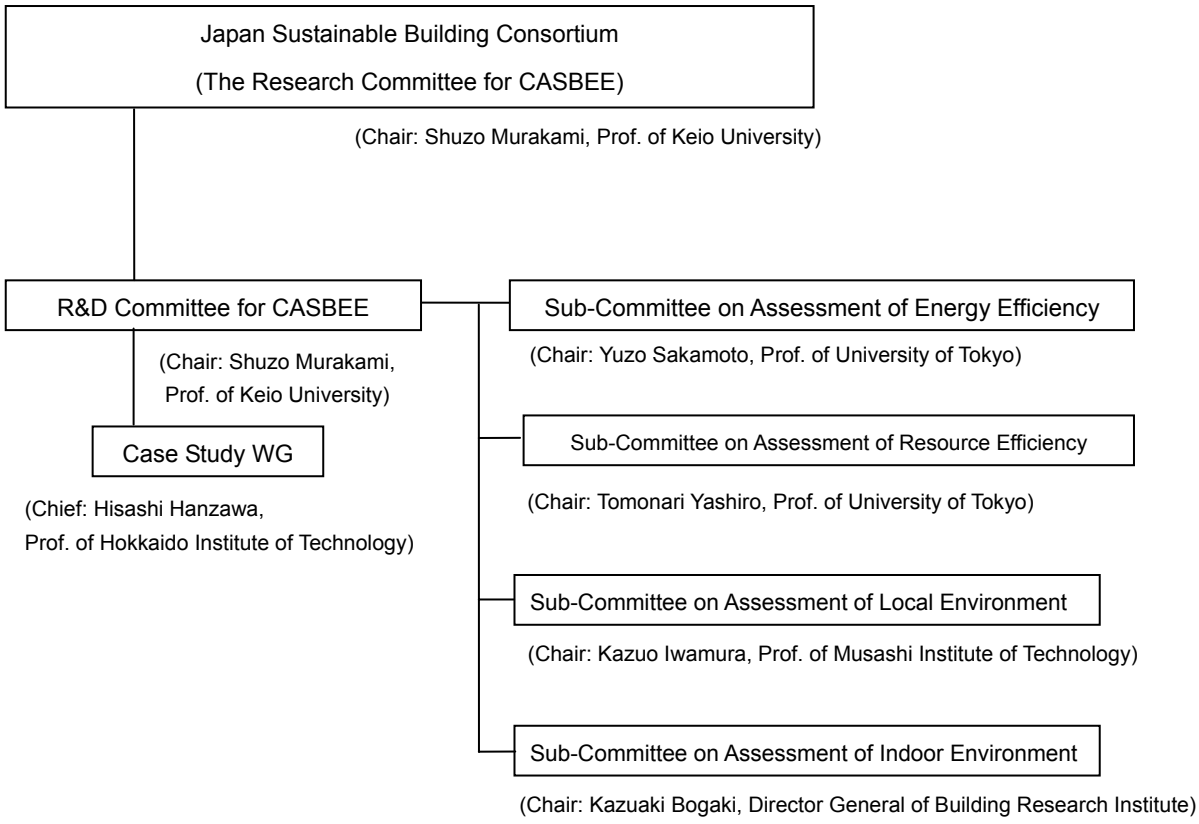
Project Organization

Research and development of CASBEE have been carried out as a cooperative project between industry, government and academia with the assistance of Japanese Ministry of Land, Infrastructure and Transport. Newly-formed JSBC (Japan Sustainable Building Consortium) and its affiliated sub-committees provide overall management of CASBEE, and the secretariat is set within the Institute for Building Environment and Energy Conservation.



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