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Development of Technologies for Long-term Durability and Repair/Renewal of Urban-type Condominiums

Housing Planning Division, Housing Department

Background and Purpose of Research

As part of the Comprehensive Technological Development Project of the Ministry of Land, Infrastructure and Transport of Japan (MLIT), the Housing Planning Division of the National Institute for Land and Infrastructure Management (NILIM) conducted research for developing various technologies for constructing sustainable condominiums that will last for more than one hundred years and can be easily renewed, repaired and rebuilt. This research was conducted as a joint research project between NILIM and the Building Research Institute, an Independent Administrative Institution (BRI-IAI), to counter the problem of poor durability of condominiums in Japan.

Research Contents

To achieve the goal of this research, three objectives were established as shown in Figure 1.

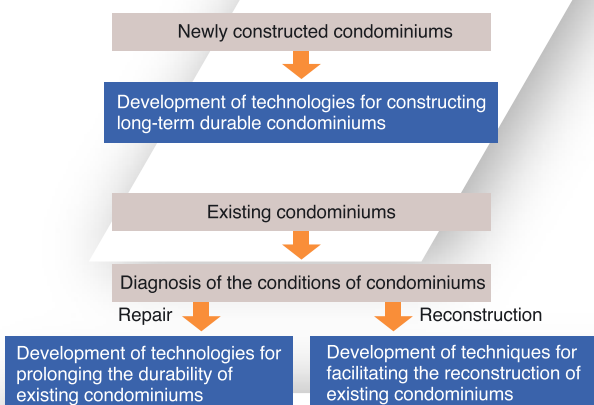


Figure 1 Three objectives of the Comprehensive Technological Development Project for condominiums

Research Results

With Objective 1 "Development of technologies for constructing long-term durable condominiums," a skeleton-infill (SI) condominium plan (a plan for designing and constructing condominiums that can be used for a long time by adapting to the changes of social conditions, with which the skeleton (S) (the frame body of building structures with high durability) and the infill (I) (the room layout and interior finishing which can be flexibly varied) are clearly separated) was proposed, based on which research and development were conducted on how to build new condominiums that will last for more than one hundred years.

Technological standards for SI condominiums with long-term durability: Technological standards were drawn up for specifying the criteria for judging whether condominiums qualify as SI condominiums.

Arrangements of legal systems and compilation of a sales manual for SI condominiums: Legal systems were improved for enhancing the diffusion of long-term durable condominiums, and a manual of two-phased sales of SI condominiums was drawn up.

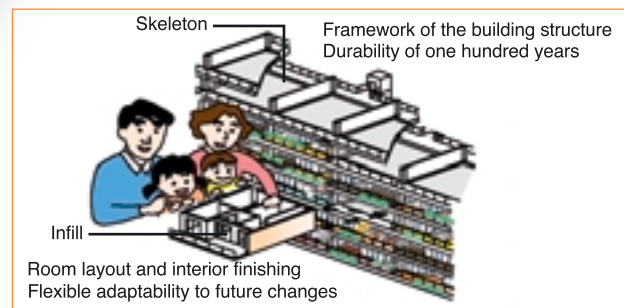


Figure 2 Conceptual drawing of a skeleton/infill condominium

With Objective 2 "Development of technologies for prolonging the durability of existing condominiums," technologies for prolonging the durability of existing condominiums were developed.

Diagnostic manual for the frame body of existing condominiums: A manual for assessing the state of deterioration of the frame body of existing condominiums was drawn up.

Manual for repairing and renewing the existing condominiums: A

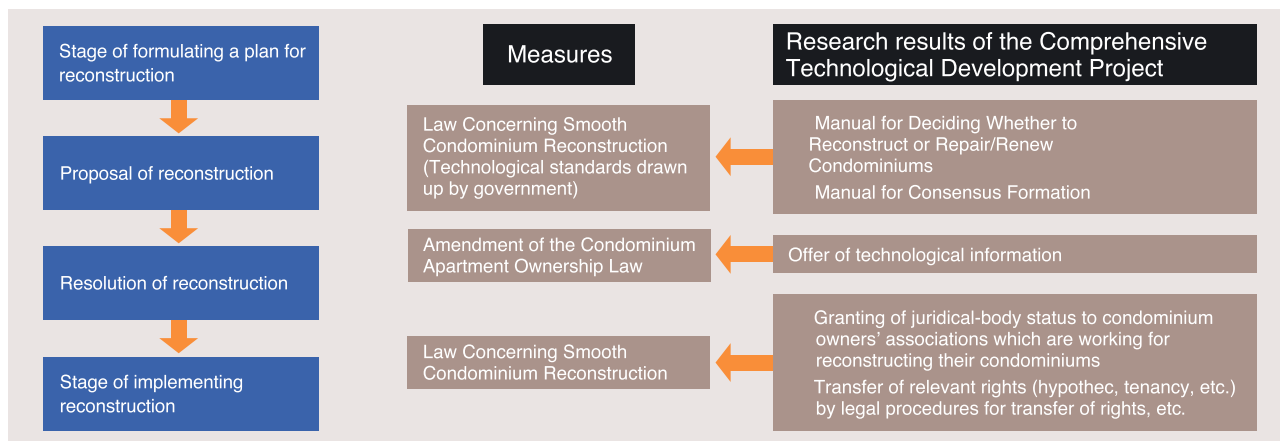


Figure 3 Outline of procedures for countering various problems regarding condominium reconstruction

guideline for selecting suitable methods for repairing and renewing existing condominiums was drawn up.

With Objective 3 “Development of techniques for facilitating the reconstruction of existing condominiums,” research on solving problems in reconstructing condominiums was conducted.

Manual for Deciding Whether to Reconstruct or Repair/Renew Condominiums: A guideline was drawn up for use by condominium management associations when making a decision about whether their condominiums should be reconstructed or repaired/renewed.

Manual for Consensus Formation: Procedures for forming consensus among owners about reconstructing condominiums, various management know-how, and other relevant matters were compiled into a manual.

These results were reflected in the “Law Concerning Smooth Condominium Reconstruction” (enforced in December 2002), and the above guideline and manuals were designated as the sources of technological information to support the enforcement of this law.

Report on the Symposium on “Creation of a Beautiful National Land”

**Kenji Ueshima, Director of Airport Terminal Division Secretariat of “Creation of a Beautiful National Land” Project Team
National Institute for Land and Infrastructure Management
Ministry of Land, Infrastructure and Transport**

During the period of high economic growth in Japan, the national land was developed uniformly throughout the nation in response to construct infrastructures rapidly in large quantities. Although it is now common practice to create beautiful infrastructures as the emphasis has shifted from mass production to the beautiful production, there remains misunderstanding that it is sufficient to create infrastructures cosmetically. However, the key in the future is to construct a beautiful national land by comprehensively unifying various factors such as disaster prevention, flood control, scenic beauty, and the environment.

Unfortunately, measures for creating and handing down a beautiful national land to future generations have not been sufficiently clarified. The National Institute for Land and Infrastructure Management (NILIM) of the Ministry of Land, Infrastructure and Transport (MLIT) has therefore decided to focus on this issue. First, it was decided to hold a meeting for experts from various disciplines to exchange opinions on how to create a beautiful national land, to provide a direction for our research.

This materialized as the “Symposium on Creation of a Beautiful National Land” held on September 18, 2002, in Tokyo. Following the

special guest’s greeting by Vice Minister Toshiki Aoyama of MLIT, Professor Heita Kawakatsu of the International Research Center for Japanese Studies gave a keynote lecture on the “Vision of Land Design.” Subsequently, chaired by Professor Osamu Shinohara of the University of Tokyo, a panel discussion titled “The Ideal National Land to be Handed Down to Future Generations” was held by a group of panelists organized by Executive Chairman Kazuo Tatsuno of the Japan Essayists’ Club, Professor Mikiko Ishikawa of Keio University, Mr. Naoyuki Kuniyoshi of the director of the Urban Design Office in Yokohama City, and Director General Haruhiko Okuno of NILIM (Photo 1).

Major comments given at the symposium that are considered important in creating a beautiful national land for the future are summarized below.

Paradigm of a beautiful national land creation

- The reason why the paradigm of a beautiful national land creation in Japan has not been clearly established is because urbanization has focused on catching up Western civilization since the Meiji Period, in which beautiful rural areas in the early modern ages were neglected. Although infrastructures are designed in high quality during the pre-war period, they don’t maintain the level in the post-war period because of materialism.
- Important items in each region should be found and conserved.
- Soil, water, greenery, serenity, winds, rice fields, and streams should be restored in urban areas.

Individual awareness

- As the creation of a beautiful national land takes time and energy, each individual must have a strong will and profound insight.

Participation of residents

- Through frank exchanges of opinions between local residents and government officers, a concept particular to the region will emerge, and the designs for materializing the concept will gradually become sophisticated.
- Creation of a beautiful national land will eventually help revitalize the regional community.

New study fields

- New intellectual structures, such as national land studies and regional studies, need to be established, aside from Western studies that were necessary when Japan was trying to catch up Western countries.

Based on the opinions presented at the symposium as stated above, NILIM will construct a framework for research, conduct various investigations, and publish information on the creation of a beautiful national land.



Photo 1 View of the panel discussion at the symposium

“Implementing Agreement on Research Cooperation in the field of Road Science and Technology” Renewed with Swedish Counterpart

Advanced Road Design and Safety Division

A signing ceremony of the Implementing Arrangement (IA) between the Swedish National Road Administration (SNRA) of the Ministry of Industry of Sweden and the National Institute for Land and Infrastructure Management (NILIM) of the Ministry of Land, Infrastructure and Transport of Japan concerning research cooperation in the field of road science and technology was held on October 4, 2002 at NILIM in Tsukuba, Japan. Representing SNRA, Director Dick Jonsson of the National Road Management Department brought with him two copies of IA, both of which had been already signed by Mr. Ingemar Skogö Director General of SNRA. After giving a greeting address, Mr. Haruhiko Okuno, Director General of NILIM signed both copies of the IA.

This IA was first concluded between SNRA and the former PWRI in October 1999. However, the IA was handed over to NILIM, when NILIM was inaugurated in April 2001 as part of the administrative reforms of the Japanese government, and so the IA needed to be renewed. Contents of the IA were also reviewed as follows: 1) Road Technology in Snowy and Cold Regions; 2) Bridge Technology; 3) Intelligent Transport Systems; 4) Road and Traffic Management; and 5) Procurement Methods.

As part of the bilateral research cooperation, two workshops have been held so far: the 1st Workshop was held under the joint auspices of the former PWRI and SNRA in December 2000 at Swedish National Road and Transport Research Institute (VTI) in Linköping, Sweden; and the 2nd Workshop was held under the joint auspices of NILIM and SNRA in February 2002 in Tsukuba, Japan.



Photo 2 Participants in the signing ceremony

Report on the Disaster of hand Slide, Flood and Fire

Research Center for Disaster Risk Management Urban Planning Department

Debris Flow Disaster in Kamaishi City, Iwate Prefecture

At around 7:00 a.m. on July 11, 2002, a slope failure occurred near the headwaters of Matsubara-no-sawa in the Kasshi River basin (located at 1-chome, Matsubara-cho, Kamaishi City, Iwate Prefecture, with the river basin area of 0.03 km²) the collapsed sediment developed into a debris flow and surged into a residential area located downstream. This disaster resulted in the death of two people and destruction of three houses, two of which were completely destroyed except for their foundations (photo 3).



Photo 3 View of the destroyed houses (July 12, 2002)

Field Survey of Flood Damage with Ringed-Levee

We investigated the flood damage in OGAKI City, GIFU Prefecture, on July, 2002. It has many ringed-levees for a long time, and has been protected from flood damage. In this flood damage, agricultural land and urban area were inundated by floodwater from the OTANI River of the KISO River system, but the damage was restrained in minimum by the ringed-levee.

We conducted a field observation of the flood-marks and estimated the areas and depths of inundation (Figure 4).

The results of this survey will be used for validating flood analysis models and for drawing up countermeasures for inundation in the areas where urbanization is progressing.

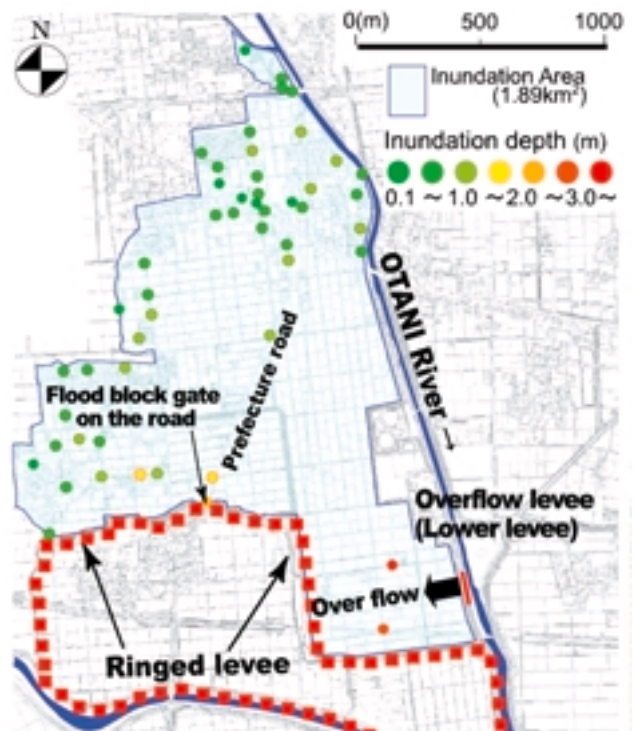


Figure 4 A map of the inundated area(OGAKI City).

Investigation of a City Fire in Wakkanai

On June 29, 2002, a fire broke out in a densely wooden built-up area in the downtown of Wakkanai City, Hokkaido Prefecture (Photo 4). Fanned by strong winds in the area, large amount of fire brands and large blazes were produced in the fire and 25 houses and buildings of 9,000 m² floor area were burnt down. As this fire showed, many densely wooden built-up areas which are vulnerable to fires still remain in the center of urban areas. The Urban Disaster Mitigation Division investigated the fire by conducting a field survey, including collecting materials and documents from institutions, interviewing those affected and witnesses, inspecting the state of damage to houses and buildings, and clarifying how the fire brands scattered.

These results will be used for the ongoing research project "Development of Assessment and Countermeasure Technology for Disaster Prevention in Town Planning".



Photo 4 Burnt Area (Courtesy of Wakkanai City Municipal Office)

The 11th Conference on Public Works Research and Development in Asia

The 11th Conference on Public Works Research and Development in Asia convened from October 15 to 24, 2002. It opened at NILIM,

Tsukuba, and closed in Okinawa.

Attendees included officials from overseas government agencies responsible for implementing public works research and development policies. Participating countries were India, Indonesia, Korea, Laos, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Japan.

The subject of Common Interest for this conference was "Water Resources and River Management for Sustainable Development". In this conference, presentations and discussions were based on country reports on the subject of common interest prepared by the participants. Through the active discussions, each participant achieved a better understanding of the circumstances faced by each country and mutually learned from the experiences of other countries. The conference reached the conclusion: "Water problems such as shortage of water resources, floods and sediment flows are serious concerns for Asian countries. Water Resources and River Management are core policy issues which should be considered by each and every country in Asia."

Finally, all participants expressed their wish that the conference be continued for the progress of research and development on civil engineering technology in Asia. The conference was thus concluded with great success.



Photo 5 Symposium in Okinawa, October 2002

TECHNICAL NOTE of National Institute for Land and Infrastructure Management (July-September, 2002)

No	Title of Paper	Names of Divisions	No	Title of Paper	Names of Divisions
31	Cooperative Research on Nondestructive Inspection for Welded Joints of Steel Highway Bridges -Round Robin Tests for Evaluation of Automatic Ultrasonic Testing Machines- Automatic Ultrasonic Testing Manual for Welded Joints of Steel Highway Bridges[DRAFT]-	Bridge Division	38	A Study of the Policy Evaluation Index for Airports Development from User Side View	Research Coordinator for Advanced Airport Technology
32	Influence of Sediment Transport on Topography and Bed Material Change at River Mouth Estuary	River Division	39	Rehabilitation of Airport Asphalt Pavements with Cement Treated Asphalt Mixtures	Airport Facilities Division
33	Study of Force Support Systems of Particulate Media using Discrete Element Method	Coastal Disaster Prevention Division	44	Study on Estimation of Future Maintenance and Rehabilitation Costs in Japanese Ports	Port Planning Division
34	Estimation of S-wave Velocity Structure by Use of the Microtremor Array Observation	Coastal Disaster Prevention Division	45	A Development of the International Maritime Container Flow Model in East Asian Region	Port Systems Division
35	Development of Numerical Wind Wave Tank using Scheme to Solve Gas and Liquid Mixing Flow Field -Construction of Completely Conservation Algorithm-	Coastal Zone Systems Division	46	Summary of the Lecture in "AIRPORT VISTA 21" for Aviation Network and Airport Development	Research Coordinator for Advanced Airport Technology
36	Study on Perceptual Properties of Coastal Landscape	Coastal Zone Systems Division	47	Interview with Dr.Tadao UMESAO "The Civilization and Infrastructure of Japan"	Construction Economics Division
37	Study on Fort #2 in Tokyo Bay as Landscape Heritage	Coastal Zone Systems Division	50	Report of the 1st Evaluation Committee of NILIM in FY 2002 "Evaluation of the results of research and development activities in FY 2001 and the course in the future"	Research Administration and International Cooperation Division

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