Efforts for Improvement of Standards in the Building Sector

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1. Introduction

The Building Department has been carrying out administrative support for structure, fire prevention, and planning/projection and formulation/revision of each sector of environment/equipment based on technological knowledge of the technical standards such as the Building Standards Act, Housing Quality Security Act (law in referent to the promotion of quality securement), Energy Conservation Act (law in regard to streamlining for energy uses). I will refer to the research issues for the improvement of technological standards for which the Building Department has been addressing and the deliberation system of technological standards original draft.

2. Project research

I will indicate the outline of project research for which the building department proactively has been tackling in the following.

(1) Development of urban energy system technology heading for low carbon/hydrogen energy system utilization society (2011 – 2014)

Using hydrogen as energy media and heading for structuring urban energy system where excessive dependence on fossil fuels can be avoided and safe hydrogen piping, in addition, we developed a technology or the like to realize a reduction in emission volumes of carbon dioxide. In respect to these results, we intend to compile them as a project research report.

(2) Development of seismic capacity evaluation technology for buildings corresponding to upgrading of earthquake vibration information (2012 – 2015)

In parallel with the improvement of seismic networks and the development of seismology, the characteristics at a random spot are being clarified. Among earthquake actions observed or forecast, there are those to exceed the levels of seismic forces assumed by the current seismic design. Meanwhile, it is acknowledged that there are cases where seismic forces affecting building structures decrease to a considerable extent more than cases to regard as seismic vibration on the ground surface input into building structures as it is. In order to appropriately evaluate the earthquake resistance capability, it is crucial to carry out a thorough observation on relations between "seismic vibration" and "seismic force," in addition to accurately forecasting earthquake vibration.

Accordingly, this research collects and analyses as many earthquake observation records to clarify relations between "earthquake vibration" and "seismic force," we are tackling the development of more rational earthquake resistance capability evaluation technology for building structures.

(3) Research on introduction of new technology for building structures focusing on renewable energy (2013—2015)

In tandem with living standards, the energy consumption of buildings is on the rise. As well as proceeding with the thermal structure of buildings and instrumental efficiency still further, it is crucial to utilize natural energies existing in the building premises, and the formulation of new standards adopting renewable energy has been required for the future. In this respect, positioning of renewable solar light and earth thermal are targeted.

(4) Research on safety for timber structure three story schools (2011 -- 2015)

In October 2010, the law relevant to the promotion for utilization of timber for public architectural structures came into effect. With reference to this, the Ministry of Land, Infrastructure, Transport and Tourism commenced research to collect the necessary data for reviewing fire prevention related provisions of the Building Standards Act with respect to timber three story schools.

The existing Building Standards Act requires making a building fireproof or semi-fireproof according to the number of stories or areas requirements for the safety of evacuation safety of buildings with a multitude of visitors. For instance, in regard to schools, a three story building is required to be a fireproof building structure (major structures shall be required to be fireproof or the like.) and according to the restriction of a major structural part, the use of timbers is restricted as a whole. Furthermore, in reference to a large scale timber structure whose total area exceeds 3,000m2, due to the risk of extending tremendous effects on its peripheries, it is stipulated to make part of the major structure fire resistant. However, in a case when the building satisfies the capability to resist fire until visitors' safe evacuation/rescue are finished, even for a large scale timber structure or the like, when the fire spread does not expand to the scale exceeding 3.000m2, in order to make it a semi-fire proof

building structure for which timber is readily utilized, deliberations based on experiments have been carried out.
(5) Development of evaluation and design technology for building structure contributing to decrease in the degree of dependence on electric power (2013 – 2017)
Optimization has been effected byy verifying the effect on peak countermeasures against the peak consumption of electricity, evaluation technology for the degree of dependence on electric power for countermeasures, integrating various technologies such as equipment system including housing, contraption for frame structure, introduction of special building members and carrying out the development of revolutionary design system. Furthermore, in building structures, we have carried out technological development relevant to methods to evaluate the effect of peak shift and technological development in regard to design method to optimize peak shift, and promoted peak countermeasures in the demand side.
(6)Development of function continuing technology for disaster preparedness buildings (2013 –1016)
In the Tohoku District Pacific Ocean Coastal Earthquake which occurred on March 11, 2011, structural damages by tsunami, loss of continuous using capability in parallel with damages on nonstructural members (nonstructural wall, ceiling and so on) and damages on government office buildings expected to act as disaster preparedness lodgments emerged. With regard to structural safety against tsunami, the capability of exterior members against blown objects by tornado and in respect to damage mitigation method, we will carry out proposals for new technological development and evaluation methods with respect to damage mitigation method.
Other than these project researches, we are grappling with the subjects of research on evaluation method/standards for seismic resistance of exterior members, research on technological standards for structural calculation program contributing to smoothing of practical business for architecture, calculation methods for evacuation safety capability in building fire of structure and research on the target level and so forth.

3. Deliberation/preparation/posting for technological standards original draft

In response to damage of the Great East Japan Earthquake, we have been carrying out problem configuration corresponding to individual research and development and implemented deliberations/preparations/postings for a technological original draft.
In particular, as major matters related to the Great East Japan Earthquake, the subjects are standards relevant to structural requirements for tsunami evacuation buildings, technical standards with reference to countermeasures or the like for ceiling collapses, and deliberations of corresponding methods for long-cycle earthquake vibrations. In addition, as a matter related to research and development, there is the review and deliberations for the fire prevention standards in regard to large scale timber building structures.
Regarding these, we have established/run the Building Structural Standards Commission, Building Fire Prevention Commission which are comprised of intellectuals from academic society, and we have improved the system to carry out reevaluations for technological standards based on working-level officials.
The Building Structural Standards Commission in particular has been carrying out Great East Japan Earthquake related deliberations. The deliberations in the Commission were reflected to in the Review of Guidelines on Structural Requirements in respect to Tsunami Evacuation Buildings, November 2011, and MLITT's Housing Bureau Director General's Notice, Technological Standards Announcement for Designated Evacuation Facilities based on the Tsunami Disaster Prevention Regional Creation Act, December 2011, MLITT's announcement of the case to prescribe to prescribe a specific ceiling and structurally safe structuring method for the specific ceiling, August 2013, and other MLITT announcements.
Concerning these, utilizing the building standards improvement promotion project (in regard to necessary matters for the state to formulate/revise technological standards in the building standards act, we publicly appeal for applicants to carry out collection/accumulation or the like for basic data on experiments, etc. with reference to assignments configured by the State, and subsidize for its expenses in this project. Established in 2007, deliberations have been carried out.

4. Assignment for the future

As problems related to disasters for the future, there are countermeasures for long-cycle earthquake vibrations. With regard to long-cycle earthquake vibrations, although we carried out an appeal for opinions by offering a draft proposal for a long-cycle earthquake vibration countermeasure in December 2008, prior to the Great East Japan Earthquake, we are carrying out reevaluation of the draft proposal, referring to observation data and deliberations in the central disaster prevention conference and deliberations in the earthquake survey research promotion headquarters.

[Sources]

1) TECHNICAL NOTE of NILIM No.759 pp. 109 -116
http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0759.htm