

**Department of
Architecture and Building Engineering in 2012**

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Overview of Research Activities

ARCHITECTURAL PLANNING / CITY PLANNING

Jun UENO and Masumi MATSUMOTO

Tohru YOSHIKAWA and Ryo SANUKI

Development of Methods for Analyzing Network of Community Facilities

Tohru YOSHIKAWA and Ryo SANUKI

In Japan, community facilities network reconstitution is demanded by social informatization, aging and maturation. To provide theoretical models and examples for the reconstruction planning, convenience of community facilities and their most suitable placement were analyzed in Tama, Tokyo area and Tohoku districts. In this year, the analysis of the gas service stations in Tohoku district and theoretical study of the distribution of facilities which substitute the function of the house were conducted.

A study on activation and update of the residential area in the suburbs

Tohru YOSHIKAWA, Noriyoshi ICHIKAWA, Jun UENO and Ryo SANUKI

The huge residential area in the suburbs formed in postwar Japan including Tama New Town is in a period of planning activation and update in response to low birthrate and aging as well as population decline of the future society situation in Japan. In order to provide useful basic knowledge for the planning, this project studied the placing form of parking lots in the suburban shopping centers, impression about sound and smell in the streets of the suburban residential area, life convenience of the super high-rise apartment complexes located in the suburbs and the situation of the bathing other than home in Tama New Town.

Development of the evaluation method for the existing building stock on the basis of location

Tohru YOSHIKAWA

It is the problem important to our country, which is leaving for the low birthrate and aging society, to utilize a large quantity of buildings accumulated after the war as effective social property. To this end, methods easy to use for evaluating the existing building stock easily would be effective. Therefore, this study aimed at the development of the method to evaluate existing stock buildings based on the location. In this year, a theoretical study was conducted on validity of the method which uses the mean distance from a user to facilities as an index.

Motoki TORIUMI

ARCHITECTURAL DESIGN AND HISTORY

Katsuhiro KOBAYASHI and Akira KINOSHITA

Analyses on Composition of Modern and Contemporary Architecture

Katsuhiro KOBAYASHI, Akira KINOSHITA

One of the main purposes of architectural design research is to clarify morphological principles that give birth to architectural beauty. For this purpose, it is important and effective to abstract compositional principles and compositional methods from existing architectural works and to examine the design principles. In the academic year of 2012, design of recent high-rise buildings, architectural works of OMA Games Stiring and so on were analyzed. Parts of these studies were and are to be published in Summaries of Technical Papers of Annual Meeting, A.I.J.

Development of Architectural Design Method

Katsuhiro KOBAYASHI, Akira KINOSHITA

In architectural design research, it is also important to apply design principles and compositional methods abstracted by analyses to actual architectural design work. Thereby theory and practice, in other words, basic research and high-level application would be synthesized. In the academic year of 2012, an entry design for competition of restoration of Haichi Cathedral was made. In addition, the winning design work for architectural competition "the energy-saving next-generation house model" held by Yokohama-city was actually constructed under Kobayashi's supervising.

Research on Conversion and Renovation of Existing Building Stocks

Katsuhiko KOBAYASHI

It is becoming one of the most important and social subject in architectural field of Japan to find out and create various methods to revitalize the existing building stocks. In the academic year of 2007, from the viewpoint of architectural design, we published books on conversion buildings located in U.S.A., Italy, France, Germany, Australia and Finland. In the academic year of 2011, we executed research trips to investigate conversion buildings in Norway, Netherland, Belgium and Germany and inn the academic year of 2012 we made investigation on conversion buildings in Hong Kong, Singapore and Makaysia. The result of these research was published as "Rebirth of Buildings - Architectural Conversion in the World II", Kajima Publising Co. March 2013

Study on English Baroque Architecture

Akira KINOSHITA

Christopher Wren, Nicholas Hawksmoor, John Vanbrugh are so called "English Baroque Architects". Largely affected by continental classical style, they invented unique architectural style by manipulating original design vocabulary. Especially Vanbrugh's design is characteristic. His usage of medieval elements for the elevation and the arrangement of the plan created unique architectural style. In the academic year of 2012, Vanbrugh's compositional method was analyzed by examining the design process of Eastbury.

Yukimasa YAMADA

Studies on the Architectural History of Timber-framed Churches in the Northern Vietnam

Yukimasa YAMADA, Ryuta OHASHI (Tokyo Kasei Gakuin Univ.)

Christianity in Vietnam, since its introduction early in the sixteenth century, has been evolving and expanding to an indigenous culture among the society, convention and thoughts different from European countries. We are focusing attention on two Catholic dioceses that have been played most important rolls in the history and culture of Christianity in the Northern Vietnam, Bui-Chu diocese and Phat-Diem diocese. Collaborating with the administration office of each diocese, we attempt to conduct surveys and analysis of existing timber-framed churches, and to show their architectural features and the process of their transition. And also, we try to build up the multi-directionally-operated Database System, through sharing information with religious communities and their supporters for the preservation and activation of culture and tradition in the Northern Vietnamese Christianity. In this fiscal year, we tried to focus on two-storied timber-framed structure as one of the most developed methods in the Vietnamese historical architecture, and also discussed the architectural features seen at the entrance facades including the churches with non-wooden structure.

Studies on Historic Architecture and Urbanism in the Islamic World

Yukimasa YAMADA

Although numbers of the historic architecture in the Islamic world have their own peculiar features in the architectural techniques and designs, their nature has not yet been understood adequately in Japan, nor has their urbanism as their agglomeration. In a series of our successive studies on the architectural history and urbanism in Islam, we have conducted scientific research on the medieval architectural styles in the Iberian Peninsula, such as Islamic and Mudejar, travelling around 17 cities in total. And we also discussed spirit screens found in Chinese Islamic architecture, mainly mosques, and submitted a research note about a symbolic carving of bull seen at the Fatimid city gate of Cairo.

Surveys and Studies on the Preservation of Traditional Villages and Vernacular Architeture in Asia

Yukimasa YAMADA

Since a number of traditional villages and vernacular architecture with historical and cultural values have been disappearing rapidly in the Asian countries, their preservation is an urgent issue. Making surveys and studies from this point of view, in this year, we have conducted a series of surveys and analysis on traditional villages and houses in Vietnam. In this fiscal year, we made two reports on architectural features of traditional houses in Tien Giang, Dong Nai and Hue provinces.

Studies on the Role of Public-Private Partnerships in Managing Heritage Cities

Yukimasa YAMADA

For the implementation of programs and measures in managing the revitalisation and promotion of the tangible and intangible heritage of cities and historic urban landscapes, the positive involvement of stakeholders at all

levels, not only policy makers, urban planners, city developers and architects, but also property owners, citizens, conservationists, private foundations and businesses, is becoming important. Thus, the public-private partnerships (PPP) in the management of heritage cities and historic urban landscapes is receiving plenty of attention across the world. Last July, we participated in an experts' meeting on this growing importance of PPP in Yogyakarta, Indonesia, and made a presentation on a case of success in Japan, and investigated innovative models of collaboration for managing heritage cities. Finally, the member of meeting also prepared a series of recommendations for the consideration of ASEM Ministers of Culture in September 2012 to discuss the topic "Managing Heritage Cities for a Sustainable Future".

Masao KOIZUMI

(1) Research on Accessibility of Urban and Architectural Space

Masao KOIZUMI

The First Stage of the Research is to analyze the Relationship between Housing and the City. This Research will be generalized into an Analysis of Relation between Architecture and Urban City.

These Researches will cover Areas such as; Type of Connection and Distance between Housing and the City, an Arrangement of Territories, Strength of the Boundary between Different Territories, etc. These Basic analyses will be developed into Research and Practice of a Design Method concerning Accessibility in an Urban Scale.

(2) Research on Housing Transformation Reflecting the Change of Family

Masao KOIZUMI

Today a Family Style has transformed because of an Increase of Divorce and the rapid Progress of the Aging Society. But still most of the Houses are planned for so called "Nuclear Family".

The Goal of this Research is to develop a Planning Method for Housings and propose a new Typology, through the Analysis of Contemporary Japanese Family and their Life Style. Collective Housing will be a main Target for this Theme.

Jun INOKUMA

Yuusuke KOSHIMA

Tomohiko AMEMIYA

CONSTRUCTION MANAGEMENT AND BUILDING MATERIALS

Seiichi FUKAO

Research on Activation Method of Public Residential Buildings Built in the Mass-housing Era

Seiichi FUKAO

Most of public residential buildings built in the mass-housing era require to be refurbished. In FY2012, I analyzed the actual conditions of residential building regeneration in European countries.

Research on the Construction of Multi-unit Residential Building

Seiichi FUKAO

S/I housing, of which building system is designed dividing into two parts: skeleton (or support, structural elements) and infill (interior components), is widely noticed as a promising building system of multi-unit residential building. In FY2012, I promoted a research on flexibility of dwelling unit design in residential buildings.

Yoshinori KITSUTAKA and Koichi MATSUZAWA

Surface Soiling and Washing Method for Building External Materials with Sealed Joint

Yoshinori KITSUTAKA and Koichi MATSUZAWA

This paper describes the actual state of surface soiling and washing effect for the external wall finishing materials with sealing joint. Outdoor exposure test of the specimen inclined against the horizontal level was performed for 6 months. A washing test was performed for the outdoor exposure test specimen and the color distribution of

the specimen was measured by an image scanning technique. A washing effect of specimen was evaluated and theoretical formula for the dirt deposition was considered. A prediction method for the color change of the specimen under long-term outdoor exposure test and the specimen washed by high-pressure water was proposed.

Study on vegetable wall greening on the ALC panel of different grooving

Yoshinori KITSUTAKA and Koichi MATSUZAWA

Sometimes the way of the wall surface planting is used for an anti-heat island phenomenon. ALC panels are thought to be suitable for greens (the general term of vegetables) because they are superior to water absorption and water retention and easy to groove. In this study, the effect of grooving shape of the ALC panels for planting on the growth of greens those have different root shape.

A Predict Method for Adhesion of Radioactive Contaminated Particle by Rainfall on Building External Material Surface

Yoshinori KITSUTAKA and Koichi MATSUZAWA

The Fukushima nuclear accident contaminated a large area, and radioactive contaminated particles adhered on the external wall surface by dirt deposition and rainfall. Removal of these contaminant particles from concrete structures is the issue which must be solved immediately for the reconstruction and restoration of damaged area. In order to remove these contaminated particles from the surface, a prediction method for the contaminant area and the amount of adhesive particle on the surface should be needed. In this study, a prediction method for the adhesion of radioactive contaminated particle on concrete surface by rainfall was investigated. In this study, a framework on the prediction of adhesion for particle contaminated with radioactive material on an external wall surface by rainfall was proposed.

Deformation properties of mortar subjected to multi-axial stress in hardening process

Yoshinori KITSUTAKA and Koichi MATSUZAWA

At early ages during hardening, concrete like mass concrete is affected by high temperatures due to cement hydration, changes in moisture content due to moisture transfer, and temperature stress due to differences between the surface and internal temperatures of concrete. In this study, the authors investigated the deformation properties of mortar cured under different temperature, humidity, and triaxial stress conditions during early hardening period up to an age of 3 days.

Influence of adhesive and tile dimension on bending properties of tile finishing ALC panel

Koichi MATSUZAWA and Yoshinori KITSUTAKA

When tile finishing is used for ALC panel, it is pointed out that the bending cracks load of ALC panel decreases because strain difference between a tile and a panel is concentrated to the joint. In this research, the effect of adhesive and tile dimension on bending properties of tile finishing ALC panel was investigated. And strain distribution was also examined by using FEM analysis.

Fracture properties of concrete subjected to high temperature heating

Koichi MATSUZAWA and Yoshinori KITSUTAKA

Concrete structures, which serve various purposes, are subjected to a number of deteriorative factors during their service life. Because strength decreases, as for the concrete affected by the high temperature heating, it is expected that the cracking becomes easy to occur. When investigating cracking, however, it is considered important to evaluate not only crack propagation properties but also crack initiation. Fracture mechanics techniques were therefore employed in this study to investigate fracture properties related to the crack initiation and propagation of concrete exposed to high temperature heating environments of 100 to 800 °C for a certain period of time.

Makoto TSUNODA

Studies on Activation Technique of Public Building Stock

Makoto TSUNODA

In Japan, demolition and new construction based on declining in the durability and increased availability of buildings continues to be practiced. This practice is unfavorable from the viewpoint of utilization of the existing building stock. Activation technique is necessary for leading preservation and improvement of the public property. In this year, we paid attention to the classroom of the elementary and junior high school and clarified the conversion of the room classroom and causation with the placement. we grasped the actual situation of the influence that the entrance position in a new institution function gave for conversion. When partial conversion did school architecture,

it was often changed in the institution use that was near to an existing function, and it became clear that approach design technique of that purpose was necessary.

Organization of Subcontractor for Stock Housing

Makoto TSUNODA

Contents of improvement, such as reform, were diversified in requirement of residents. Therefore, the details of construction and its cost were complicated. As regards realization stock-based societies, the productive organization of effective utilization for stock housing, especially contribute to residential requirement were in urgent need. And it was necessary to creating the local housing construction network owing to sustainable improvement. In this year, we paid our attention to risks such as outstanding payment for the costs of construction in the builder at the time of the house reform and grasped the actual situation of the malfunction before the reform start of construction. For the influence that malfunctions brought, we clarified one end of the coping method that a builder took in a reform construction process. We derived following three points to lower influence of the both resident, builders, that accumulating the correct information about the house as a prior stage, improving the quality of the field work before the construction start, making the document which is useful for the reform construction at the construction stage. In addition, we paid attention to continuous maintenance, update and clarified the actual activity of the supplier in the detached housing estate. It was revealed that the residential area management by the supplier in the housing estate varied according to housing complex scale or resident age group and house superannuation degree and rebuilding rates. Furthermore, we paid attention to the method that separated materials and construction in the house reform and grasped the annual conditions and problems. We made clear at a way of thinking of the risk allotment for the participation method of the builder who satisfied the demand of the resident.

Research on how to configure the renovation construction methods corresponding to the building stock

Makoto TSUNODA

Although we are supported by using the formulas of the various construction system for performance is required in new construction, there is a completely different conditions in terms of new construction and renovation that are present in a pre-existing condition. And that the work of the components to the contents of the construction methods in new construction is not seen to reflect. Therefore, there is some relationship between the role of members in the construction methods and improved performance as a result of each repair. In the renovation, it is considered that the contents of the construction system is particularly reflected in the constituent members to direct. In this year, we make a large-scale exterior wall repair method at design stage and construction stage, and clarify the designer on the limitation of the repair design and the point to keep in mind at the construction. It showed that it greatly depended on the repair design contents about the main constituent relations of design and construction.

Sangjun YI

IMPROVING THE EFFICIENCY OF PUBLIC FACILITIES MANAGEMENT

Sangjun Yi

In Japan, many infrastructural works were constructed during the period of rapid economic growth following the Second World War. Today, the cost of repairing, improving, and maintaining those facilities is on the rise. Public facilities of the municipality face a similar situation. However, although many municipalities realize the need for public facilities management, they hesitate to take concrete steps toward a solution because of their fear of increasing costs, a lack of know-how, and an uncertainty about what to change. Another problem is that in many municipalities, maintenance and management is not the concern of the entire organization but rather the responsibility of the building repair department. This study showed that all of the public facility activities, such as planning, operation, and maintenance efficiency, are included in public facility management, and the cause of the municipality's mismanagement was not only related to technology and fiscal conditions but also to the municipality's structural organization. Moreover, the purpose of this study is to explain the current state of the municipality's organizational structure and its approach to public facility management and to identify the organizational structures and management processes that are most efficient.

STRUCTURAL ENGINEERING

Manabu YOSHIMURA

Reproduction of First Story Damage of Buildings Designed According to Old RC Standards Based on Experimental Data

Manabu YOSHIMURA

Severe first story damages following the shear failure of first story short columns are one of the typical damages observed in old RC buildings during earthquakes. The nonlinear analyses for this case were conducted, where short column's shear behavior was simulated based on the column collapse tests. The building to be analyzed was determined such that these short columns might have a realistic clear height. The pushover and dynamic analyses well reproduced the severe first story damages that were observed in old buildings during earthquakes.

Relations between Seismic Capacity Index, I_s , and Earthquake Response Drift for Medium- and Low-rise RC Buildings with Story Collapse Mechanism

Manabu YOSHIMURA

The relations between Seismic Capacity Index, I_s , and earthquake response drift for nine and three story buildings with story collapse mechanism was studied. In the study I_s values were rendered variables. The study has revealed that, 1) the response drift is greater for the nine story building than for the three story one because the drift concentration on the mechanism story is severer for the former than for the latter, and 2) consequently, for the given allowable level of drift, the nine story building has to possess I_s value greater than the three story building.

Kazuhiro KITAYAMA

1. Flexural Resisting Performance for Prestressed Reinforced Concrete Interior Beam-Column-Slab Subassemblages with Transverse Beams under Earthquake Loading

KITAYAMA Kazuhiro and ENDO Toshiki

The ultimate objective of this study is to propose estimation method which can evaluate easily deformation capacity at different limit states with good accuracy for prestressed reinforced concrete (PRC) flexural beams, eventually aiming to formulate a performance-based seismic design methodology for PRC buildings.

Actual buildings have both slabs and transverse beams. Therefore, two beam-column-slab subassemblage specimens with transverse beams and a plane beam-column subassemblage specimen for comparison were tested under static load reversals to investigate hysteretic characteristics and the process of damage for PRC beams with slabs. Crack widths for beams and the top surface of a slab were measured using a digital microscope of great precision. All specimens were designed to form beam yielding mechanism. A diameter of prestressing plain bars for PRC beams, i.e., 11mm and 21 mm, was chosen as a test parameter. Two deformed steel bars with a 13 mm diameter were placed at the top and the bottom of a beam section for all specimens. Concluding remarks drawn from the study are as follows.

- (1) Lateral force capacity attained to the peak for all specimens at or after yielding of PC tendons, after beam longitudinal bars yielded. After the peak capacity, lateral force capacity descended sharply due to buckling and rupture of beam longitudinal bars, accompanying with concrete severe crushing at beam ends.
- (2) The equivalent viscous damping ratio heq , which is used to represent an extent of the fatness of a hysteresis loop in restoring force characteristics, was computed for each half a loading cycle in a top tension or a bottom tension for a T-shaped beam section. When the sum of tensile yielding forces of longitudinal bars, slab bars and PC tendons in a top tension was quite greater than that in a bottom tension, the heq value in a bottom tension was very greater than that in a top tension. In contrast, when a difference in the sum of tensile yielding forces of steel under a top and a bottom tension was small, the heq value was almost same in both cases.

2. Flexural Performance for Cast-In-Place Concrete Piles Strengthened by Steel Tube

KITAYAMA Kazuhiro and TAJIMA Yuji (Asiss Corporation)

Flexural performance for situ concrete piles strengthened by a steel tube at a top region of the pile were investigated by static load reversal tests. Four specimens with a diameter of 500 mm corresponding to a one-fifth scale to actual piles were tested through cantilever type loading. Axial compressive load applied to a pile, concrete compressive strength and existence or none of lateral hoops were varied in the test. Conclusions drawn from the study are as follows.

- (1) Flexural strength predicted by the generalized superposed strength equation agreed well with that obtained by the test in cast-in-place concrete piles strengthened by a steel tube. Flexural strength by the test under an axial load of 1500 kN was, however, 0.92 times smaller than that computed by the generalized superposed strength equation. This was caused by the fact that contribution to flexural resisting moment by compressive concrete at a critical section in the test did not reach the value predicted by the generalized superposed strength equation.
- (2) Peripheral (hoop) strain of a steel tube in a tensile zone of a pile section, subjected to tension in an axial direction due to bending moment, resulted in compressive strain according to Poisson's ratio of steel. Lateral hoops placed

in concrete did not play a role of confinement to peripheral (hoop) strain of a steel tube.

(3) Strains at some locations within one hoop were not uniform; strain did not develop in a tensile zone of a pile section, whereas strain yielded in tension in a compressive zone of a pile section.

3. Estimation of Deformation Capacity after Flexural Yielding for Beams in Reinforced Concrete Frame

KITAYAMA Kazuhiro and ENDO Toshiki

Deformation capacity of reinforced concrete (R/C) beams in beam-column moment-resisting frames can be estimated precisely up to yielding of longitudinal reinforcement according to Guidelines for Performance Evaluation of Earthquake Resistant R/C Buildings published by Architectural Institute of Japan in 2004. The proposed method to estimate deformation capacity corresponding to a restorable limit and a safety limit for R/C beams, however, is not verified through laboratory tests. Therefore, three cruciform beam-column subassembly specimens were tested in 2010 to investigate deformation capacity of R/C beams.

It is usual for construction of R/C frames that beam longitudinal bars pass through both beams and beam-column joint panel over several spans in a R/C frame. This causes interaction of bond deterioration along beam bars within a beam-column joint panel and in a beam, which provides much influence on earthquake resistant performance for a R/C frame. In the study in 2012 to research deformation capacity after yielding of longitudinal bars for a R/C beam, beam deflection was resolved into four components; A) shear deformation within a hinge region at a beam end, B) deformation due to pullout of a beam longitudinal bar from both a beam-column joint panel and a beam, C) deformation derived from plastic hinge rotation, and D) elastic flexural deformation in a beam outside of a hinge region. The contribution ratio of these components to beam deflection was evaluated for specimens tested in 2010.

The component C) plastic hinge rotation shared 38 to 73 percent of the beam deflection for all specimens, which was greatest among four components. The contribution ratio of the component B) deformation due to pullout of a beam longitudinal bar changed according to bond condition along beam bars within a beam-column joint panel; ranging from zero to 5 percent for a specimen with good bond whereas from 4 to 18 percent for a specimen with poor bond. The component D) elastic flexural deformation in a beam outside of a hinge region shared 26 to 58 percent of the beam deflection for the interior beam-column subassembly with a large shear span beam.

Deformation in R/C beams at shell-concrete crushing, which is one of factors governing a restorable limit state, was predicted by the summation of the four components above-mentioned. To achieve this prediction, both methods to evaluate strain distribution along a beam longitudinal bar passing through a joint panel and a beam span and predict the slip of a beam longitudinal bar at a center of a beam-column joint panel were proposed. Although predicted deformation at shell-concrete crushing by the proposed method was smaller than test results, i.e., 0.83 times that observed in the test, the proposed method can improve the accuracy for quantitative evaluation of deformation capacity at shell-concrete crushing comparing with AIJ Guidelines published in 2004.

4. Analytical Study on Shear Resistant Mechanism for Reinforced Concrete Perforated Beams

KITAYAMA Kazuhiro

For reinforced concrete (R/C) perforated beams, reinforcement around an opening is necessitated since the opening provides much ill influence on earthquake resistant performance, especially on ultimate shear strength for the perforated beam due to reduction of sectional area of the beam and stress concentration on the vicinity of the opening. Closed-type steel is frequently placed as reinforcement around an opening accompanied with regular stirrups. Shear failure mechanism and shear force-carrying mechanism for R/C perforated beams reinforced by such devices around the opening, however, is not understood. Therefore, shear resistant mechanism for R/C perforated beams reinforced by closed-type steel around the opening was researched through two-dimensional non-linear finite element analysis (called FEM analysis).

R/C perforated beam specimens with closed-type steel reinforcement to an opening, which were tested by Shinohara et al. in 2010, were used for the FEM analysis. Adequacy to modeling for FEM analysis, such as division of concrete elements, constitutive law of materials and bond condition along beam bars, was at first verified using test results. The sectional-area and the elevation size of closed-type steel reinforcement to the opening were, then, varied in the analysis. Following findings were obtained from the FEM analysis.

(1) Effect of closed-type steel reinforcement to an opening on ultimate shear strength for the perforated beam was more enhanced by less amount of stirrups, greater angle of closed-type steel to a beam axis and larger elevation size of closed-type steel.

(2) When stirrups were placed in a perforated beam up to the limitation on shear reinforcement, enhancement of ultimate shear strength due to closed-type steel reinforcement to an opening was slight.

(3) Closed-type steel mitigated damage to concrete around an opening by restraining diagonal cracks near the opening from widening, and preventing tension softening of concrete.

5. Seismic Behavior and Damage by the 2011 East Japan Earthquake to Reinforced Concrete School Building Retrofitted by Steel-braced Frame

KITAYAMA Kazuhiro, ENDO Toshiki and YAMAMURA Kazushige

Field reconnaissance and seismic performance evaluation were carried out in 2011 to a reinforced concrete school building with three stories which suffered moderate damage during the 2011 East Japan Earthquake although the building was retrofitted by steel-braced frames for the first, second and the penthouse stories. Four R/C columns failed in shear for the third story, where no seismic retrofits were conducted. In this study, push-over analysis and earthquake response analyses were carried out using a multi-degree of freedom system or a three-dimensional frame model to investigate seismic behavior and the effect of seismic retrofit for the building.

Earthquake motions at the ground surface were deduced from the equivalent linear analysis such that an acceleration measured at 112 meters below the ground at KiK-net Haga Observatory located 2 km away from the school building was input to the engineering bed-rock surface, to take the magnification to earthquake motions due to a surface layer of soil into account. Peak accelerations at the ground surface were magnified by the soft ground from 173 gal under ground to 558 gal in the east-west direction and 177 gal under ground to 511 gal in the north-south direction. Acceleration time-histories obtained here were used in earthquake response analyses to the school building.

Following findings were obtained from earthquake response analyses replacing the school building with a three-degree of freedom system.

- 1) The peak drift angle for the first story during the earthquake for the retrofitted building was reduced to 0.7 times that for the original building without retrofit. In contrast, the peak drift angle for the third story of the retrofitted building increased to 1.5 to 2.0 times that for the original building without retrofit since the lateral stiffness for the third story became small relatively to that for the first and second stories retrofitted by steel-framed braces.
- 2) The peak drift angle for the third story of the retrofitted building was 0.3 to 0.4 %, which was consistent with the fact that four columns failed in shear for the third story in the actual building.

Response of the building under horizontal bi-directional earthquake motions was, then, computed by the non-linear analysis program called SNAP using a three-dimensional frame model. Diagonal steel chords in a steel-braced frame were replaced to the axial spring element with pins at both ends. Results of the analysis agreed well with actual damage to the building. Up-lift rotation of all two-story steel-braced frames occurred for the earthquake response analysis. Damage of many shear walls and beams in the transverse direction remained to be minor such as crack occurrence, although some of those suffered flexural yielding or failed in shear. The peak drift angle for the first and second story retrofitted by steel-braced frames decreased to 0.8 to 0.9 times that for the original building without retrofit. The peak drift angle for the third story, in contrast, increased from 0.34 % to 0.57

Effective seismic retrofit which can mitigate actual damage for the third story was, at last, investigated by earthquake response analyses for the building assuming that two steel-braced frames are placed at the third story in a multi-story position or a staggered position, and seismic slits are provided between columns and spandrel walls ranging from eighth to fourteenth row in the C frame for all stories. The peak response drift angle for all stories was smaller for the retrofit in a staggered position of steel-braced frames on two-story steel-braced frames than that in three-story steel-braced frames. Up-lift rotation of two-story steel-braced frames was prevented by the retrofit in a staggered position for the third story, accompanied with buckling or tensile yielding of diagonal chords in steel-braced frames, whereas up-lift rotation dominated seismic behavior for the retrofit in a multi-story position of steel-braced frames and diagonal chords in all steel-braced frames remained to be elastic during the earthquake.

6. Questionnaire Research on Damage by the 2011 East Japan Earthquake to Reinforced Concrete Buildings with Seismic Rehabilitation

KITAYAMA Kazuhiro

It becomes apparent by field reconnaissance organized by Architectural Institute of Japan that several reinforced concrete (R/C) buildings suffered moderate or severe damage by the 2011 East Japan Earthquake although those buildings had retrofitted seismically. Therefore, a questionnaire research was carried out through facsimile or web mail to 63 local self-governing bodies located at a site where the JMA seismic intensity scale was equal to or greater than 6(-) grade due to the earthquake in Tohoku and Kanto districts. The questionnaire asked whether there were damaged buildings or not due to the earthquake in spite of conducting already seismic retrofit, and outline of seismic retrofit and damage conditions if there was a damaged building.

Four or fifteen local self-governing bodies responded that they had or did not have damaged R/C buildings with seismic rehabilitation respectively. The number of local self-governing bodies without any reply was thirty-eight. Only three buildings suffered some damage to structural elements which resist earthquake-induced forces. Damages to non-structural elements such as ceilings and partitions were reported for fifteen buildings. There were many damaged seismic joints.

7. Seismic Performance for Existing Precast Reinforced Concrete Shear Wall Retrofitted around New Opening

KITAYAMA Kazuhiro

Assuming that a new opening will be provided to a shear wall in existing buildings constructed by reinforced concrete precast wall system (Called WPC) for multiple modern life style, eight three-dimensional half-scale specimens with slabs and orthogonal walls to a web wall were tested in 2009 under static load reversals to study on influence of a new opening and effect of retrofit on seismic behavior.

The effect of retrofit around a new opening on seismic performance was investigated in 2012 through Specimen B5S, whose opening was reinforced by both vertical steel channels and a horizontal steel beam attached to a top of the opening. The top of vertical steel channels attached on an edge of the opening were welded to the horizontal steel beam, whereas the bottom of vertical steel channels were not connected to concrete or an anchorage plate in the lower story because it is desirable that retrofit works are completed within the concerned story only. A control specimen without an opening (called W5) and a specimen with an opening which was not strengthened (called N5S) were picked up for comparison.

Lateral force-carrying capacity was almost equal among three specimens regardless of whether there was a new opening and retrofit around the opening or not. Hysteretic loops for the wall with seismic retrofit around a new opening resulted in a fat spindle shape comparing with a monolithic wall without an opening, showing good energy dissipation.

Deformation mode of a web wall with a new opening reinforced by vertical steel channels and a steel beam was similar to that without an opening; the whole side wall panel in tension uplifted and concrete at compression fiber of another side wall in compression suffered severe damage. This was caused by strong unity between both side wall panels divided by the new opening due to the steel beam attached to a top of the opening.

When a safety limit state is defined as the attainment to the story drift when lateral force-carrying capacity descended to 80 percent of the peak capacity, a drift angle at a safety limit state was 1.2 % for the web wall with a new opening reinforced by steel, which deteriorated to the half of the safety limit drift angle for the web wall with a new opening but not strengthened. This deterioration was attributed to the rupture of fillet welding at a horizontal steel-joint which connects the second story precast R/C wall panel with the first story wall.

The steel beam attached to a top of a new opening did not enhance the lateral force capacity for the web wall with the opening since the steel beam did not work as a bending-moment-resisting member such as a boundary beam between coupling shear walls.

8. Earthquake Resistant Performance of Reinforced Concrete Building Damaged by the 2011 East Japan Earthquake under Retrofit Construction

KITAYAMA Kazuhiro

A reinforced concrete (R/C) three-story school building, located in Nasu town in Tochigi prefecture, which was under construction for seismic rehabilitation using steel-braced frames suffered moderate damage under the 2011 East Japan Earthquake. A plan of the building is 108 meter long for the longitudinal direction, and the first term construction for seismic retrofit was completed but the second term construction was not yet when the 2011 Earthquake attacked the building. Damage due to the earthquake concentrated on a non-retrofitted area of the building; three R/C columns failed in shear and severe shear cracks classified as Grade 3 were observed for four columns.

Residual seismic capacity after the earthquake was estimated to be 0.77 times the seismic capacity before the earthquake for the first story in the longitudinal direction. In this estimation of the residual seismic capacity, the damage grade for a steel-braced frame was assumed to be similar to that for a shear wall with boundary columns at both ends, which seemed to underestimate the residual seismic capacity. Thus the damage of the building was classified into the moderate level.

Shear cracks occurred in R/C short beams framing into a three-story steel-braced frame in the orthogonal direction, and flexural cracks at both ends of boundary beams to a steel-braced frame. A few cracks like round slices were observed for boundary columns adjacent to a steel-braced frame, which seem to be induced by pure tension in the first and third stories. These indicates the symptoms of uplift rotation of the multi-story steel-braced frame or tensile behavior due to bending moment of the boundary columns adjacent to the multi-story steel-braced frame.

Jiro TAKAGI

Kazushige YAMAMURA

Toshiki ENDO

ENVIRONMENTAL ENGINEERING

Noriyoshi ICHIKAWA

Nobuyuki SUNAGA

Research on Comfortable Bioclimatic Architecture

For the benefit of preserving global environment, the effective use of energy consumed in architecture and the utilization of natural energy are indispensable factors for architectural design. Furthermore to popularize Bioclimatic Architecture (BA) which is buildings designed by considering energy conservation, natural energy utilization and comfortable environment, it is necessary to clarify the actual performance of BA and to establish evaluation methods which are simple and widely acceptable for the public. We have been engaged in the research of these themes, and, in recent years, we give high priority to improve building stocks.

In this academic year, we mainly carried out following studies and activities.

1. Environmentally Friendly School (Eco-School)

a) Actual Performance of Eco-School; We measured and examined the actual thermal performance of four Eco-Schools opened from 2009 to 2012 in Tokyo, which were designed with heat/cool pit (CHP), out-side thermal insulation, horizontal louvers and so on. We are specially studying about the CHP. The four schools have different form CHP. In this year we clarified the thermal performance of new CHP which has the shortest length.

b) Energy Consumption and Architectural Standard of High Schools in Tokyo; As a part of Leading Project of our university, "Constriction Technologies Accelerating the Environmental Load-Reduction for the Society that Utilizes Metropolitan Building Stock", we are studying about the effective energy conservation methods for high schools in Tokyo. In this year we carried out a case study about building thermal performance of the existing and new school buildings, in order to create the New Tokyo Energy Efficiency Specifications 2013.

2. Development of Insulated Door at Inside of Window (IDiW)

From 2008 we have been showing the high thermal performance of IDiW, that is the insulated doors installed at the inside of windows. In this year we examined the effects of IDiW manufactured by the way of trial for an actual house. They are shown at <http://aijkbld.blog.fc2.com/blog-category-6.html>.

3. Effect of Home Energy Management System (HEMS)

We have been studying the effect of HEMS on the energy conservation in detached houses with PV system by filed measurement and questionnaire survey, collaborating with a house maker from 2010. In this academic year, we started to study about the recommendation extent of energy saving action and life-style for each family.

4. Refinement of Japanese Wooden House

We designed a refinement of Japanese wooden house built in 1983. In this refinement new thermal insulation methods are adopted and several IDiW, above mentioned, were installed. A PV system of 3.2 kW was newly installed, too. In first year, the energy consumption of this house was about 6,500 kWh and the power generation by PV was about 4,000 kWh, therefore the solar power rate is about 64

5. Effect of Out-Side Thermal Insulation for RC Apartment House in TAMA NEW TOWN

We started a research about the effect of out-side thermal insulation for RC apartment houses in TAMA NEW TOWN. In this year, we start a monitoring and questionnaire survey to 10 buildings, in which 146 families are living, that were improved fully by thick insulation material and evacuated glass for window.

6. Other outcome

1) N. Sunaga proposed a new outline of education of architectural environment at the committee of AIJ. This outline reflects to the new curriculum of our department which is under considering now.

Akihiro NAGATA

Uncertainty Modeling of Building Utilization

Akihiro NAGATA

Actual Utilization of buildings is varies a great deal and raises a variety of heat load and energy consumption of buildings. This study aims to develop a method to incorporate this uncertainty into heat load calculations. This year, electricity consumption data of shops in a shopping center was analyzed.

Thermal Performance of the Window

Akihiro NAGATA

The thermal performance of the window vary a great deal depending on attachments such as shutters and shades. In this study, thermal transmittance tests were performed on several attachments.

Masayuki ICHINOSE

(1) Development of integration of Building Information Modeling and architectural environmental simulation

Masayuki ICHINOSE, Osamu NAGASE (Nikkensekai Co., Ltd.), Yoji ISHIZAKI (Obayashi Corp.), Yoshinobu ADACHI (SECOM Co., Ltd.) and Makoto Oura (Autodesk Inc.)

Integrated scheme for HVAC design including heat load simulation, studying system and stream of air was investigated and verified. This scheme includes the process that convert from building model described by International Foundation Classes to elements for the architectural environmental simulation including heat load and Computation Fluid Dynamics. In this process, the versatile method is found out and the desired elements supposed for integrating with the architectural environmental simulation.

(2) Investigation of practical calculation model for solar heat and light considering spectral characteristics of solar and building facade

Masayuki ICHINOSE

This research suggest practical and accurate calculation model. This model reflect spectral characteristics of solar and building facades by using color temperature of black body for visible radiation and two wave-bands including Ultra violet and visible and Near infrared for overall solar heat radiation. Approximate method of color temperature and two wave-bands are verified in the various conditions of solar altitude and climate. This study is based on the long-term spectral solar irradiance data that is separated to direct and diffuse components.

(3) Fundamental study on realization of the lighting planning method considering spectral characteristics of lighting and surface reflectivity

Nozomu YOSHIZAWA (Tokyo University of Science) and Masayuki ICHINOSE

This research investigates actual estimation method of the visible color rendering that consider spectral characteristics of light source and surface reflectivity. Because common compute graphic method for example RGB involves relatively large error in the process of multiple reflection, multi-band model based on the principle component analysis is suggested and verified.

(4) Practical research on the utilization of daylight

Takashi INOUE (Tokyo University of Science) and Masayuki ICHINOSE

Multidisciplinary and practical approach to realize utilization of daylight and solar shielding is studied. These include collaborative control of automatic control blind and dimming lighting system, newly developed control of color temperature illumination system, retro reflective solar shielding film, and so on. Some of them come to be supplied as commercially available systems.

(5) Study on the ideal concept for the regulatory and system of architectural environment and building facility

Takaharu KAWASE (Chiba University), Akira TAKAKUSAGI (Toyo University), Masayuki ICHINOSE, et al.

Current Building Standards law of Japan and relevant law have many problems in aging, discrepancy between regulatory and so on. Particularly, because department of architectural environment and building facility have been increasing the social importance and priority in practical business since the regulatory established, it is desired to study from academic aspect immediately about these problems. In this study, fundamental elements of the building facility for protecting human life, health and property are investigated. Form these points of view, issues as bellows are studied; 1 Ideal concept for regulatory of outside and indoor environment, 2 Ideal concept for regulatory of energy conservation and global environment problem and 3 Ideal concept for system of facility engineers. The detailed items are segmentalized and listed to corresponding current regulatory. From these studies, lack of items and overlapping or discrepant points are visualized.

(6) Study on the buildings of subsequent generation corresponding to the global climate change

Kazuhiro SOGA (Kagoshima University), Taro MORI (Hokkaido University), Satoshi NAKAYAMA (Okayama University of Science), Masayuki ICHINOSE, Hayato HOSOBUCHI (Akita Prefectural University) and Kohki KIKUTA (Hokkaido University)

By using future forecast weather data estimated by Japan Meteorological Agency, the ideal concept of the environmental buildings in 30 to 50 years later is studied. When the case of aggressive warmer climate of IPCC is assumed, cooling load for HVAC system will occupied in whole year that is varied from current status. Detailed investigation including changing of the balance of sensible and latent heat remain to be studied.

STRATEGIC RESEARCH CENTER

Shigeru AOKI

List of Research Activities

ARCHITECTURAL PLANNING / CITY PLANNING

Jun UENO and Masumi MATSUMOTO

Tohru YOSHIKAWA and Ryo SANUKI

1. Refereed Articles

Satoru OZAWA, Toshiya IWAMATSU, Motoyasu KAMATA, Tohru YOSHIKAWA and Noriyoshi ICHIKAWA, Examination of evaluation method for quantity of water resources considering architectural planning: Study on the potential quantity of available water resources in consideration of regional characteristics of each prefecture (part 3), *Journal of Architecture, Planning and Environmental Engineering* (Transaction of Architectural Institute of Japan), vol.78, No.684, pp.135-140, (Feb-2013), (in Japanese)

Ryo SANUKI, Tatsuya SUZUKI and Tohru YOSHIKAWA, Analysis of Changes in Accessibility to Gas Stations Due to Their Suspension and Restoration - A Case Study in Iwate and Miyagi prefectures damaged by Great East Japan Earthquake, *Journal of Architecture, Planning and Environmental Engineering* (Transaction of Architectural Institute of Japan), vol.78, No. 683, pp.149-157, (Jan. 2013), (in Japanese)

Ryo SANUKI, Tatsuya SUZUKI and Tohru YOSHIKAWA, Availability Analysis of Facilities focusing on Accessibility and Capacity in an Emergency: Case Study on Gas Station in Aomori City, *Journal of the City Planning Institute of Japan*, No.47-3, pp.859-864, (Oct.2012), (in Japanese)

Tatsuya SUZUKI, Ryo SANUKI and Tohru YOSHIKAWA, Analysis of relation between single people living activities and locations of facilities to replace functions of houses, *Journal of Architecture, Planning and Environmental Engineering* (Transaction of Architectural Institute of Japan), No.675, pp.1131-1137, (May. 2012), (in Japanese)

Takehiro KONDO and Tohru YOSHIKAWA, Study on three-dimensional urban form which minimizes travel cost: Assuming introduction of hierarchical districts and transportation, *Journal of Architecture, Planning and Environmental Engineering* (Transaction of Architectural Institute of Japan), No.675, pp.1087-1093, (May. 2012), (in Japanese)

Kenichi AIBA and Tohru YOSHIKAWA, An analysis on the recognition of regions from the viewpoint of distribution of buildings with topographic names: Case study on apartment buildings with names concerning hills in Azabu and Jiyugaoka, *Tama New Town Research*, No.12, pp.132-141, (Mar. 2012, distributed in April), (in Japanese)

2. Proceedings of Oral Presentations

Ryo SANUKI, Tatsuya SUZUKI, Tohru YOSHIKAWA, Eiji SATOH, Toshiro KUMAKAWA, Accessibility and Availability of Hospitals in an Emergency: Comparison between Two Scenarios of General Car Transport of Victims, *The 44th APACPH Conference, Sri Lanka*, op15-5, (Oct. 2012)

YOSHIKAWA Tohru, Application of Cell Aggregation Based on Random Walk Model for Two Dimensional Lattice to Adjacency Analysis of Land Use Using Grid Data, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-1, pp.1009-1010, (Sep.2012), (in Japanese)

SHIGENO Hokuto, YOSHIKAWA Tohru and SANUKI Ryo, Analysis of Facility Location in a Central City in Terms of Resistance to Horizontal Walking - Focusing on the Intentionality of Visiting Facilities -, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-1, pp.1013-1014, (Sep.2012), (in Japanese)

KAGAMI Taiga, YOSHIKAWA Tohru, SANUKI Ryo, A Store location analysis focusing on the utilization of the roads -A Case Study on the roadsides of Route 20 in Kofu Urban Area-, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-1, pp.1015-1016, (Sep.2012), (in Japanese)

UEHARA Hiroya, YOSHIKAWA Tohru, SANUKI Ryo, Analysis on Construction and Consolidation of Public Facilities in Terms of Transition in User Structure: A Case Study on Elementary and Secondary Schools in Tama New Town, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-1, pp.1017-1018, (Sep.2012), (in Japanese)

NOGUCHI Yushi and YOSHIKAWA Tohru, Analysis time series change of optimal arrangement of facilities and houses focusing on frequencies of facilities used by age groups, *Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan*, F-1, pp.1021-1022, (Sep.2012), (in Japanese)

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FUKUSHIMA Hiroko, SANUKI Ryo, ICHIKAWA Noriyoshi, UENO Jun, YOSHIKAWA Tohru, A Study on Land Use Transition around Musashi-Kosugi Station Focusing on the Origin of Land Use Formation, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1045-1046, (Sep.2012), (in Japanese)

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Yuki NARIMOTO, Ryo SANUKI, Tohru YOSHIKAWA, Comparison of access to shopping districts in city area with large scale commercial facilities in the suburbs by automobile - A case Study of Sakata, Yamagata Prefecture -, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.1147-1148, (Sep.2012), (in Japanese)

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SUZUKI Tatsuya, SANUKI Ryo and YOSHIKAWA Tohru, Analysis of Population Distribution in Terms of Living Activities and Locations of Facilities to Replace Functions of Houses, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, F-1, pp.213-214, (Sep.2012), (in Japanese)

3. Others

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Takehiro KONDO and Tohru YOSHIKAWA, Formulation of total cost in a three-dimensional urban model containing compact city system - Assuming introduction of hierarchical districts and transportation -, Reports of the City Planning Institute of Japan, No.11, pp.15-19, (May.2012), (in Japanese)

Tohru YOSHIKAWA, The operation method of the roller coaster: Look back toward this one-year Tama New Town, Tama New Town Research, No.14, p.1, (Mar. 2012, distributed in April), (in Japanese)

Tohru YOSHIKAWA, Singing a new town: Moscow, Cheryomushki by Dmitri Shostakovich, Tama New Town Research, No. 13, pp.122-123, (Mar. 2012, distributed in April), (in Japanese)

Motoki TORIUMI

ARCHITECTURAL DESIGN AND HISTORY

Katsuhiro KOBAYASHI

1. Refereed Articles

Sho KADONO, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Design Methods for Architectural Conversion and its Urban Backgrounds in Copenhagen, Journal of Architecture and Planning (Transaction of AIJ), Vol.77 No.678 pp.1983-1989 2012.8, (in Japanese)

Sho KADONO, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, A Study on Design Methods of Recent Architectural Conversion in New York, The 9th International Symposium on Architectural Interchanges in Asia, Korea: Architectural Institute of Korea, A-11-2, Nov.2012 (in English)

2. Proceedings of Oral Presentations

Naoki OKADA, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Sho KADONO, Shinya OKAZAKI, Kazuya IWAI, Shinpei SATO, Miyuki TSUDA, Yuta FUJII, Studies on the Architectural Conversion in Netherland, Part 1- Design Method of Conversion in Amsterdam-, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.553-554, Sept.2012 (in Japanese)

Shinpei SATO, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Sho KADONO, Shinya OKAZAKI, Kazuya IWAI, Naoki OKADA, Miyuki TSUDA, Yuta FUJII, Studies on the Architectural Conversion in Netherlands, Part 2 - Design Method of Conversion in Rotterdam, Delft and Haarlem etc.-, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.555-556, Sept.2012 (in Japanese)

Yuta FUJII, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Sho KADONO, Shinya OKAZAKI, Kazuya IWAI, Naoki OKADA, Shinpei SATO, Miyuki TSUDA, Studies on the Architectural Conversion in Belgium, Part 1 Design Method in Conversion from Public, Commercial and Residential Facilities, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.557-558, Sept.2012 (in Japanese)

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Miyuki TSUDA, Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Sho KADONO, Shinya OKAZAKI, Kazuya IWAI, Naoki OKADA, Shinpei SATO, Yuta FUJII, Studies on the Architectural Conversion in Norway, Part 2 - Design Method in Conversion from Industrial Facilities-, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.563-564, Sept.2012 (in Japanese)

Toki HASHIGUCHI, Katsuhiro KOBAYASHI, Akira KINOSHITA, Taichi MIYAWAKI, Studies on Design of Recent Skyscrapers (Part1)-Exterior of Super-tall Buildings after 1990, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.565-566, Sept.2012 (in Japanese)

Ryuichi SUZUKI, Katsuhiro KOBAYASHI, Motoki TORIUMI, Akihiro NAGATA, Akira KINOSHITA, Taichi MIYAWAKI, Toki HASHIGUCHI, Ryota IUCHI, Studies on Design of Recent Skyscrapers (part2)-The Intention of Design about Supertalls in Dubai, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.567-568, Sept.2012 (in Japanese)

Ryota IUCHI, Katsuhiro KOBAYASHI, Akihiro NAGATA, Motoki TORIUMI, Akira KINOSHITA, Taichi MIYAWAKI, Toki HASHIGUCHI, Ryuichi SUZUKI, Studies on Design about Recent Skyscrapers (Part 3)- Tendencies and Typical Works in Abu Dhabi -, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.569-570, Sept.2012 (in Japanese)

Taichi MIYAWAKI, Katsuhiro KOBAYASHI, Motoki TORIUMI, Akihiro NAGATA, Akira KINOSHITA, Toki HASHIGUCHI, Ryuichi SUZUKI, Ryota IUCHI, Studies on Design of Recent Skyscrapers (Part 4)-Tendencies and Typical Works in Doha -, Summaries of Technical Papers of Annual Meeting, A.I.J., pp.571-572, Sept.2012 (in Japanese)

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3. Others

3-1 Monographs / Technical books

Katsuhiro KOBAYASHI (Supervisor of Japanese Translated Version), ARCHITECT-The Works of the Pritzker Prize Laureates in their Own Words, edited by Ruth Peltason and Grace Ong-Yan, Maruzen, Dec.2012 (in Japanese)

Katsuhiro KOBAYASHI, Tetsuya MITAMURA, Sho KADONO, *Rebirth of Buildings - Architectural Conversion in the World II*, Kajima Publishing Co. March 2013(in Japanese)

3-2 Research Reports

Katsuhiro KOBAYASHI, Akira KINOSHITA, Sho KADONO, “Design Methods of Architectural Conversion Cases in Netherland, Belgium and Denmark”, The International Symposium on Sustainable Urban Environment 2012 by the Graduate School of Urban Environment Sciences of Tokyo Metropolitan University, 3 November 2012, Tokyo Metropolitan University, 2012. (in English)

Katsuhiro KOBAYASHI, et al., *Date Base of Architectural Conversion -Hong Kong, Singapore, and Malaysia*, March 2012 (in Japanese)

Katsuhiro KOBAYASHI, *Studies on Converted Architecture Abroad - Toward Better Conversion desing in Japan*, Annual Report 2011, The Kajima Foundation, pp.158-164 (in Japanese)

3-3 Manuals / Reviews

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3-4 Works / Products, etc.

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Yukimasa YAMADA

1. Refereed Papers

Tomoharu KATANO, Yukimasa YAMADA: *A Study on Architectural Characteristics of Churches with Vertically-elongated Timber-framed Structure in Northern Vietnam*, *Journal of Architecture and Planning (Transaction of AIJ)*, Vol.77, No.675, pp.1241-1248, May.2012 (in Japanese)

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Li TAO, Yukimasa YAMADA: *Architectural Features of Spirit Screens in Chinese Islamic Architecture*, *Summaries of Technical Papers of Annual Meeting, A.I.J.*, DVD, pp.457-458, Sep.2012 (in Japanese)

Yukimasa YAMADA, Tomoharu KATANO: *Typology and Historical Changes of the Façade of Church –Studies on Wooden Catholic Churches in the Northern Vietnam (10)*, *Summaries of Technical Papers of Annual Meeting, A.I.J.*, DVD, pp.461-462, Sep.2012 (in Japanese)

Takuya SHIRAGA, Yukimasa YAMADA, Mikako YAMADA, Hiromichi TOMODA (Showa Women Univ.): *A Study on Architectural Features of Traditional Houses in the Southern Vietnam–Cai Be in Tien Giang province and Phu Hoi in Dong Nai province*, *Summaries of Technical Papers of Annual Meeting, A.I.J.*, DVD, pp.493-494, Sep.2012 (in Japanese)

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Masao KOIZUMI

2. Proceedings of Oral Presentations

KOIZUMI Masao:the possibility of architecture and city over environment and energy, the 5th design works of annual meeting in Annual Meeting AIJ 2012 invitation review, AIJ, 2012

3. Others

3-2. Research Reports

Masao KOIZUMI and others, Isogo Smart House Project - phase2 “Research on smart community based on energy share”, 2012.

Masao KOIZUMI and others, “Housing design and Environment- Housing-Physics-Design ”, Urban Renaissance Agency (UR), 2012.

Masao KOIZUMI and others, Hybrid Mokuzou Lab Pre seminar“Instruction of large and medium wooden structures”, Nikkei Business Publications, Inc. , 2012.

Masao KOIZUMI and others, Project symposium“School Architecture of ‘Art Polis’ ”, Architecture Exhibition of Kumamoto Art Polis 2012, Kumamoto prefecture, 2012.

Masao KOIZUMI and others, Annual Meeting AIJ 2012 - Panel discussion in the field of global and environment, Smart city and sustainable building design “Smart City- Case of Overseas”,AIJ, 2012.

Masao KOIZUMI, the 10th Symposium of Tokyo Institute of Technology“School building living up with neighborhood”,Tokyo Institute of Tecnology,2012.

Masao KOIZUMI, YKK AP APW Forum & Presentation 2012“Housing-Physics-Design”, YKK AP Inc. , 2012.

Masao KOIZUMI, the 179th AACA Forum“Landscape design and Community Development”, Japan Association of Artists Craftsman & Architects, 2012.

3-3. Manuals/Reviews

Masao KOIZUMI,“Design concept for ZOU-NO-HANA Park”;ZOU-NO-HANA Terrace 2009 JUNE-2011MARCH, P58-59,2012.4(in English and Japanese) park Masao KOIZUMI,“Reading Topography”;Reconstruction Planning from the Seashore Villages in Oshika·Ogatsu·Nagashimizu, P30-37,2012.4.30(in Japanese)

Masao KOIZUMI,“9 key words for healthy house”interview;MEDICAL TIMES, P33,2012.6.11(in Japanese)

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Masao KOIZUMI,“Energy-Saving in the house and the living 1”;The Energy Conversation Oct.2012 , P64-65,2012.9.30(in Japanese)

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Masao KOIZUMI, "STUDIO BENEATH RAILWAYS+STEP PLAZA"; Shin Kenchiku, P116-125, 2012.11.01 (in Japanese)

Masao KOIZUMI, "Phyigics-Design" interview; Eu Sanken Giho, P1-5, 2012.12.30 (in Japanese)

Masao KOIZUMI, "Choix energetiques a la francaise ou a la japoise?"; d'architectures 214, P20-22, 2012.12 (in French)

3-4. Works/Products, etc.

Masao KOIZUMI, Toyono Elementary School and Junior High School in Uki city, 2013

Masao KOIZUMI, others, ZO-NO-HANA Park/Terrace in Yokohama, 2012 AACA Award

Akira KINOSHITA

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Akira KINOSHITA, Katsuhiro KOBAYASHI, A Study on the Design Method of Sir John Vanbrugh -Design Process of Eastbury-, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 721-722, Sept. 2012 (in Japanese)

Toki HASHIGUCHI, Katsuhiro KOBAYASHI, Akira KINOSHITA, Taichi MIYAWAKI, Studies on Design of Recent Skyscrapers (Part 1)-Exterior of Super-tall Buildings after 1990, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 565-566, Sept. 2012 (in Japanese)

Ryuichi SUZUKI, Katsuhiro KOBAYASHI, Motoki TORIUMI, Akihiro NAGATA, Akira KINOSHITA, Taichi MIYAWAKI, Toki HASHIGUCHI, Ryota IUCHI, Studies on Design of Recent Skyscrapers (part 2)-The Intention of Design about Supertalls in Dubai, Summaries of Technical Papers of Annual Meeting, A.I.J., pp. 567-568, Sept. 2012 (in Japanese)

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Jun INOKUMA

Yuusuke KOSHIMA

Tomohiko AMEMIYA

CONSTRUCTION MANAGEMENT AND BUILDING MATERIALS

Seiichi FUKAO

Yoshinori KITSUTAKA

1. Refereed Papers

Kie Funakoshi, Haruka Takahashi, Yoshinori Kitsutaka and Koichi Matsuzawa : Study on Strength Estimation by Using Image Analysis of Backscattered Electron Image of Cement Pastes, Proceedings of the Japan Concrete Institute, Vol.34, No.1, pp.304-309, 20.12.7

Takashi Ota, Yoshinori Kitsutaka and Koichi Matsuzawa : Study on the pH Changes and Rebar Corrosion of the Reinforced Concrete due to Carbonation, Proceedings of the Japan Concrete Institute, Vol.34, No.1, pp.652-657, 20.12.7

Koichi MATSUZAWA and Yoshinori KITSUTAKA : Fracture Properties of Concrete Subjected to High Temperature Heating, J. Struct. Constr. Eng., AIJ, No. 680, pp.1477-1483, 2012.10

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Kitsutaka, Y., Takesue, N. and Tsukagoshi, M.: Aging Evaluation of Nuclear Power Plant Concrete Structures, Third International Conference on Nuclear Power Plant Life Management (PLiM), Salt Lake City, USA, CD ROM, IAEA-CN-194-1P44, pp.1-10, 2012.5

Kitsutaka, Y. and Yoshida, K.: Carbon Dioxide Capturing Ability of Cementitious Building Finishing Materials, 8th International Conference on Concrete in the Low Carbon Era, Dundee, UK, USB, No.90, pp.1-6, 2012.6

Kitsutaka, Y.: Long-term Durability Evaluation of Concrete Structures, the 9th Annual Conference of the Japan Society of Maintenology, pp.386-391, 2012.7

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YONEBAYASHI Haruka, KITSUTAKA Yoshinori, MATSUZAWA Koichi : Color Compounding Mixing Design Method for Concrete, Summaries of Technical Papers of Annual Meeting, AIJ, A-1, pp.367-368, 2012.9

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OTA Takashi, KITSUTAKA Yoshinori, MATSUZAWA Koichi : Study on the pH Changes and Rebar Corrosion of the Concrete due to Carbonation, Summaries of Technical Papers of Annual Meeting, AIJ, A-1, pp.499-500, 2012.9

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KITSUTAKA, Y.: Durability Evaluation Method on Rebar Corrosion of Reinforced Concrete, Proceedings of 1st ICMST Conference 2012, Japan Society of Maintenance, pp.141-142, 2012.11

3. Others

3-1 Publication

Japanese Architectural Standard Specification JASS 10 Precast Concrete Work, (Coauthor), Architectural Institute of Japan, 2013.2 (in Japanese)

Japanese Architectural Standard Specification JASS 5N Reinforced Concrete Work at Nuclear Power Plants, (Coauthor), Architectural Institute of Japan, 2013.3 (in Japanese)

Makoto TSUNODA

Jun OSHIMA and Makoto TSUNODA: A study on design corresponding to the building codes in comprehensive renovation with seismic retrofitting, Journal of Architecture and Planning. , NO.685 , p.565 , 2013.3(in Japanese)

Tadayoshi TOKUTAKE, Makoto TSUNODA: Relation between user evaluation and seismic retrofitting method ?focusing on educational environment of school architecture-, Summaries of Technical Papers of Annual Meeting, AIJ, E-1, pp.989-990, 2012.9 (in Japanese)

Masahiro KANEHARA, Makoto TSUNODA: A study on constituent members for improvement of performance in the exterior wall refurbishment, Summaries of Technical Papers of Annual Meeting, AIJ, E-1, pp.991-992, 2012.9 (in Japanese)

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Koichi MATSUZAWA

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Kie Funakoshi, Haruka Takahashi, Yoshinori Kitsutaka and Koichi Matsuzawa : Study on Strength Estimation by Using Image Analysis of Backscattered Electron Image of Cement Pastes, Proceedings of the Japan Concrete Institute, Vol.34, No.1, pp.304-309, 20.12.7

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3. Others

3-3 Manuals / Reviews

K. Matsuzawa : Review on Fracture Properties of Concrete Subjected to High Temperature Heating, Concrete Journal, Vol.51, No.2, pp.210-216, 2013.2

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Sangjun YI

STRUCTURAL ENGINEERING

Manabu YOSHIMURA

1. Refereed Papers

Takaya NAKAMURA and Manabu YOSHIMURA: Simulation of Old Reinforced Concrete Column Collapse by Pseudo-dynamic Test Method, Proceedings of the Fifteenth World Conference of Earthquake Engineering, Paper Number 2584, 2012

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Sho ITO, Takuya ISOGAMI and Manabu YOSHIMURA: Effects of Spandrel Walls and Hanging Walls on Shear Failure of RC Buildings Designed according to Old Standards, Part1 Analytical Methods, Summaries of Technical Papers of Annual Meeting, AIJ, C-2, pp.763-764, 2012 (in Japanese)

Takuya ISOGAMI, Sho ITO and Manabu YOSHIMURA: Effects of Spandrel Walls and Hanging Walls on Shear Failure of RC Buildings Designed according to Old Standards, Part2 Analysis Results and Discussions, Summaries of Technical Papers of Annual Meeting, AIJ, C-2, pp.765-766, 2012 (in Japanese)

Yasuhiro ABE, Takaya NAKAMURA, Manabu YOSHIMURA, Seira OWA and Masaya HIROSAWA: Seismic Retrofit of RC Columns with Side Walls by Increasing Their Width, Part1 Experimental Plan, Summaries of Technical Papers of Annual Meeting, AIJ, C-2, pp.819-820, 2012 (in Japanese)

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3. Others

Degree

Master Course: Sho ITO, Reproduction of First Story Damage of Buildings Designed According to Old RC Standards Based on Experimental Data

Kazuhiro KITAYAMA

1. Refereed papers

(1) OCHIAI Hitoshi and KITAYAMA Kazuhiro : Shear Performance Evaluation for RC Beams and Perforated Beams, Proceedings of the Japan Concrete Institute, Vol.34, No.2, pp.193-198, 2012, July (in Japanese).

(2) MURAKAMI Yuri and KITAYAMA Kazuhiro : Seismic performance evaluation of beam members in Prestressed Reinforced Concrete Frame, Proceedings of the Japan Concrete Institute, Vol.34, No.2, pp.451-456, 2012, July (in Japanese).

(3) SUZUKI Kiyohisa, WANG Lei and KITAYAMA Kazuhiro : Different limit deformation capacity of R/C Beam focusing on Beam bar bond, Proceedings of the Japan Concrete Institute, Vol.34, No.2, pp.235-240, 2012, July (in Japanese).

(4) HASEGAWA Shunichi, KITAYAMA Kazuhiro, MINAMI Susumu and TAKAGI Jiro : Seismic Evaluation of Retrofitted Wall-Type Precast R/C Wall with New Opening, Proceedings of the Japan Concrete Institute, Vol.34, No.2, pp.1051-1056, 2012, July (in Japanese).

(5) SHIMONISHIKIDA Satoshi, TAKAGI Jiro, MINAMI Susumu and KITAYAMA Kazuhiro : Improvement of Analysis Models and Comparative Studies Of Existing Wall-Type Precast Reinforced Concrete Residential Buildings - Seismic Performance Evaluation of Existing Wall-Type Precast Reinforced Concrete Residential Buildings with New Openings in Shear Walls, Part 2 -, Journal of Structural and Construction Engineering (Transaction of AIJ), Architectural Institute of Japan, Vol. 77, No.680, pp.1589-1598, 2012, October (in Japanese).

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(1) KITAYAMA Kazuhiro and YAJIMA Ryuto : Earthquake Resistant Performance of Prestressed Reinforced Concrete Beam-Column Subassemblages Forming Beam Yield Mechanism, Proceedings, 15th World Conference on Earthquake Engineering, USB-Rom, Paper No.0218, 2012, September.

(2) TAJIMA Yuji and KITAYAMA Kazuhiro : Estimation of Equivalent Viscous Damping Ratio for Flexural Beam in Prestressed Reinforced Concrete Frame, 15th World Conference on Earthquake Engineering, USB-Rom, Paper No.1948, 2012, September.

(3) TAKAGI Jiro, MINAMI Susumu and KITAYAMA Kazuhiro : Seismic Behavior of Existing Wall-type Precast Reinforced Concrete Residential Buildings with New Openings, 15th World Conference on Earthquake Engineering, USB-Rom, Paper No.0485, 2012, September.

(4) Masaki MAEDA, Kanako TAKAHASHI, Hamood ALWASHALI, Akira TASAI, Hitoshi SHIOHARA, Kazuhiro KITAYAMA, Susumu KONO and Tetsuya NISHIDA : Damage Survey on Reinforced Concrete School Buildings in Miyagi after the 2011 East Japan Earthquake, 15th World Conference on Earthquake Engineering, USB-Rom, Paper No.2591, 2012, September.

3. Oral presentation

(1) KITAYAMA Kazuhiro and MURAKAMI Yuri : Seismic Performance for Beams in Prestressed Reinforced Concrete Frame Focusing on Bond Condition along Beam Bars and PC Tendons (Part1 Outline of Tests) , Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, C-2, Structures IV, pp. 941- 942, 2012, September (in Japanese).

(2) MURAKAMI Yuri and KITAYAMA Kazuhiro : Seismic Performance for Beams in Prestressed Reinforced Concrete Frame Focusing on Bond Condition along Beam Bars and PC Tendons (Part2 Test Results and Discussion), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, C-2, Structures IV, pp. 943- 944, 2012, September (in Japanese).

(3) OCHIAI Hitoshi and KITAYAMA Kazuhiro : Evaluation of Ultimate Shear Deformation and Allowable Shear Stress for Long-Term Load for RC Beams and Perforated Beams, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, C-2, Structures IV, pp. 247- 248, 2012, September (in Japanese).

(4) ISHIKI Kenshiro and KITAYAMA Kazuhiro : Damage by the 2011 East Japan Earthquake to Reinforced Concrete School Building Retrofitted by Steel-braced Frame, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, C-2, Structures IV, pp. 45-48, 2012, September (in Japanese).

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STRATEGIC RESEARCH CENTER

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