

Annual Report

Department of
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Tokyo Metropolitan University

2023

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OVERVIEW OF RESEARCH ACTIVITIES

Architectural Planning / City Planning

Kenji TAKEMIYA

(1) Research on planning of medical facilities suitable for “team medical care”

Kenji Takemiya

In recent years, in order to respond to the improvement in the quality and safety of medical care and the increase in work due to its increasing sophistication and complexity, medical staff from various fields have divided their work based on their high level of expertise and have collaborated and complemented each other. “Team medical care,” which provides medical care that accurately responds to the patient's situation, is practiced in many medical settings. In this study, we aim to organize the characteristics of hospital spaces that support team medical care that have been planned for ward departments and administrative departments, and to understand the usage status of these spaces to effectively promote team medical care. The facility planning requirements for hospitals are shown.

(2) Research on rental housing for the elderly

Kenji Takemiya

We conducted the following four studies to plan rental housing for the elderly, where they can continue to live from an independent lifestyle to a situation in which they require long-term care. ① We grasped the nationwide development status of rental housing for the elderly that provides rent subsidies. ② We grasped the current situation, issues, and policies regarding rental housing for the elderly in municipalities with the highest number of maintained buildings. ③ We understood the operation and management system of rental housing for the elderly, its issues, and the configuration of common spaces within the housing building. ④ We grasped the actual state of living in rental housing for the elderly over time by clarifying changes in room facilities, usage of common spaces, and services used as residents' physical and mental conditions changed.

(3) Research on welfare facilities for the elderly

Kenji Takemiya

Targeting small-scale, multifunctional home care facilities in hilly and mountainous areas, first, we clarified the facility's maintenance and operation status in the hilly and mountainous area, as well as understand the service catchment area and the usage

characteristics of nursing care services. Next, we ascertained the operating and location status of the facility and clarified its relationship with the residence and usage characteristics of facility registrants. Furthermore, we conducted on-site surveys of specific facilities to gain a detailed understanding of the structure and usage of facility space, and proposed points to keep in mind when planning facilities.

These studies are to be published in Summaries of Technical Papers of Annual Meeting, AIJ.

Tohru YOSHIKAWA

Theoretical Study on Compactness of Cities

Tohru YOSHIKAWA

In Japan, urban policies for compact cities are being conducted considering the decrease in population, the lower birth rates, the aging society and the serious global environmental issues. Considering this situation, the study explored what is the compactness of cities. In this fiscal year, whether facilities should be consolidated or decentralized was analyzed by adopting the satisfaction of the users and the maintenance cost as the evaluating indexes in a model urban area with BRT.

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 fiscal year, a medium- to long-term totalized value assessment method was developed based on the assumption that facilities with declining utilization rates will be removed one after another.

Motoki TORIUMI

Masumi MATSUMOTO

Studies on Regeneration and Revitalization of New Towns

Masumi MATSUMOTO

Tama New Town is the largest new town developed 50 years ago in Japan. This series of studies aims to research and develop the methods for regeneration and revitalization of living environment of new towns, mainly exemplified by Tama New Town.

- 1) Research on housing conditions and lifestyles in Tama area.
- 2) Studies on governing body of an old condominium apartment.
- 3) Studies on community activities initiated by women residing in Tama New Town.

Studies on Sustainable Living of Elderly People in their Local Communities

Masumi MATSUMOTO

This series of studies aims to research on the living environment of elderly people who continue to live in the same community, and to research and develop supporting systems for such people.

Ryo SANUKI

I conducted urban planning and urban analysis research using urban spatial analysis methods and GIS. I also conducted applied research in different fields such as public facility policies, utilization of public space, consensus building, and community formation. Specifically, (1) examination of regional evaluation methods using public facility management and its evaluation techniques, (2) dialogue processes for public facility restructuring with public participation, (3) public facility/space utilization and community formation processes in Asian countries, and so on.

Architectural Design and History

Masao KOIZUMI

Yoshihiko ITO

Gradual change and persistence in the architecture of the medieval Iberian Peninsula and western Mediterranean regions

Regional and pre-modern aspects of the architectural modernisation process in Japan and Asia

Research on the persistence and changes in architecture and cities in the western Mediterranean during the Middle Ages (Iberian Peninsula, Maghreb, southern France, Italian Peninsula, Corsica, Sardinia and other islands). In 2023-24, several papers on early medieval architecture in Sardinia, Sicily, and the Iberian Peninsula were presented at international congresses.

Research on modern architecture in Southeast Asian cities, particularly in Vietnam, and on Tama Newtown Residential Development, Tokyo, Japan.

Fuminori NOUSAKU

Akira KINOSHITA

Analyses on Composition of Modern and Contemporary Architecture

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 2023, analysis on the composition of buildings with slanted floor and analysis on the design method with simile modeling through postgraduate dissertations study are pursued.

Development of Architectural Design Method

Akira KINOSHITA

In architectural design research, it is also important to apply design principles and compositional methods abstracted by analyses to actual architectural design works. Thereby theory and practice, in other words, basic research and intrincating manipulation would be synthesized. In the academic year of 2023, relations between

theory and design practice were explored through a design works of 4 master program design dissertations and 2 theoretical works.

Research on Design of Architectural Conversion

Akira KINOSHITA

It is becoming one of the crucial social subjects in the architectural field of Japan to find out various methods to revitalize the existing building stocks. Among these methods, architectural conversion is particularly useful and important. For more than 10 years, with my research associates, I have made research survey on architectural conversion abroad. In the academic year of 2023, through research trip to Kyushu prefecture (Nagasaki, Sasebo, Saga, Ohita, Nichinan), a survey on design methods and their social and historical backgrounds is pursued.

Study on Landscape Architecture and City in Early Modern England

Akira KINOSHITA

In the academic year of 2023, I worked on the analysis of the relation between architectural design and the development of astronomical study, survey technologies, and navigation technologies in the latter half of the 17th century, focusing on Sir Christopher Wren and Robert Hooke, who made significant contributions on the theory and practice in architecture of the period. Through the analysis on the discourse of Wren concerning the rebuilding of St. Paul Cathedral, his geometrical method of survey and structural knowledge are examined.

Construction Management and Building Materials

Makoto TSUNODA

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Studies on Housing Production System allowing the Residents to Participate in Construction

Makoto TSUNODA

Residents may participate in housing construction. This allows you to customize your home in own way and stimulates the distribution of pre-owned homes. It also helps with measures against vacant houses. These acts were called DIY (Do It Yourself). Currently, it has become popular due to the expansion of tools and materials and the introduction of technology through SNS. The fact that the work done by specialized contractors has become more familiar is also considered to be one factor that reminds us. In order to establish housing production in which residents participate, it is necessary to build assistive technologies that allow partial participation. For example, it is important to remove barriers to resident participation and lower the hurdles for participation.

In this year, we explored the possibility of renovation by residents. The actual conditions of renovations conducted by residents themselves and the businesses that support these renovations were identified. We also clarified the scope of construction for resident-participatory renovations. The motives for renovation have a wide range of contents. They include interest in construction, the DIY boom, and the influence of SNS information. It was revealed that barriers to participation are becoming lower. On the other hand, it was found that some events exceeded expectations. These included difficulties in construction, extended construction periods, and costs. In addition, details of the construction contractor's efforts to mitigate risks to the residents were found. These include experience in pre-workshop, dispatching specialists, and limiting the number of works in which they can participate. In addition, we found that there are three types of organizations that support renovations: construction companies, specialized contractors, and design firms.

Research on Building System Design for Renovation in Buildings Stock.

Makoto TSUNODA

In recent years, many performance improvements have been implemented through renovation as one of the means for long-term use of buildings. In new construction, we use various construction methods to meet the required performance. However, in the renovation, there is a completely different condition that the existing state exists. Therefore, the contents of the construction method will reflect the functions of the components that are not seen in new construction. As a result, a relationship can be found between the role of the members and the performance improvement in each

renovation construction method. Especially in renovation, it is often practiced under a wide range of requirements and limited conditions. Therefore, it is considered that the contents of the construction method are directly reflected in the constituent members.

Studies on methodology of the building improvement to be compatible with value of property and utility.

Makoto TSUNODA

Buildings that are still usable are often removed for some reason. There are various reasons for removal, such as the performance at the time of completion cannot be maintained and the way the building is used has changed. There are various reproduction methods to solve these situations. To improve the asset value when extending the life of an existing building, there are maintenance and improvement of various performances. The addition of new performance that has not been possessed until now is also targeted. Similarly, in order to improve the utility value, in addition to changing the state of the building itself, it is also required to change the function of how it is used. These two value enhancements are not independent of each other. Therefore, a program for architectural regeneration should be devised in consideration of the trade-off between the two. Nowadays, various reproduction methods such as renovation and conversion can be seen, but the reproducibility is low in addition to the strong individuality as an architecture. Therefore, the purpose is to construct a more general methodology that includes multiple value enhancements to further promote future architectural regeneration.

In this year, focusing on the design method of the converted exhibition facility, we extracted the architectural operations performed during the renovation and conversion, and grasped what kind of architectural operation combination was used for the renovated exhibition space. In addition, we organized the exhibition space that is not created in the newly built museum, the ingenuity and problems unique to the converted exhibition facility, and searched for useful knowledge for the design of future museum architecture. By creating a diversion flow and performing comparative analysis, it was clarified under what background the diversion to the exhibition facility was examined and influenced the selection process of the design method. It is considered useful to consider the part to be preserved and the part to be modified on a large scale in a long time axis in order to expand the possibility of a new design method.

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.

Yoichiro KUNIEDA

Research on optimization of demolition waste collection

In this study, a 4D analysis was conducted to simulate the waste collection generated by building demolitions or disasters. The behavior of the collection machinery model was controlled with algorithms, and an optimization proposal considering the generation load by the collection method was made. The load was calculated by cost for three processes: waste collection (using machinery), waste transportation, and waste disposal. By setting multiple structural types and regions of target buildings and comparing the analysis results, the feasibility of recycling generated waste and variations in disposal costs were identified. The collection method sorting by material type not only achieved a high recycling rate but also quantitatively demonstrated cost containment in processing expenses.

Proposal of Modeling Method for Recycled Aggregate Production Using Powder Analysis

This study proposed a method for predicting the performance of aggregates produced in recycled aggregate manufacturing in advance, using Discrete Element Method (DEM) for modeling. By modeling crushers and waste concrete using DEM software Rocky (produced by Ansys Inc.), it became possible to quantitatively analyze the behavior, stress generation, and physical properties of the produced aggregates during crushing based on physical laws. In addition to visualizing the crushing mechanism through animation, adjusting the spacing between crushing steel plates within the model, and easily changing the dimensions and properties (e.g. strength, hardness) of the waste, facilitated the formation of a database correlating input conditions with the resulting products. It is anticipated that in the future, setting manufacturing methods using machine learning techniques such as neural networks will be possible with the established database.

Study on environmental impact reduction by recycled aggregate produced by mobile crushing machines

In this study, the reduction of environmental impact expected by shifting from conventional recycling for roadbed usage to structural usage in concrete recycling was investigated using carbon emissions as an indicator. In Hokkaido as the target area, actual intermediate processing facilities, final disposal sites, and ready-mix concrete plants were plotted on a map using

geographic information system (GIS) tools. Estimation of building demolition demand based on building distribution enabled estimation of transport loads in each process. By setting scenarios based on the utilization rate of recycled aggregates for structural concrete and the location of recycled aggregate production sites, the environmental impact reduction effect generated by structural usage through the recycled aggregate production process was clarified. By accepting recycled aggregates at intermediate processing facilities in Hokkaido rejecting aggregates treatment despite having the capability, the average transport distance from demolition sites to intermediate processing facilities would be approximately half. The result demonstrates the improvement in acceptance capacity leads to an enhancement in environmental impact reduction through resource circulation.

Proposal for risk assessment of bacteria survival in Self-Healing Concrete

In this study, a method for estimating the survival risk of bacteria used in self-healing concrete was proposed. Assuming that pressure due to collisions during mixing is the main factor causing the death of bacteria, a 4D analysis of materials and spores by mixing machine was conducted using Discrete Element Method (DEM) software Rocky (produced by Ansys Inc.). Visualization of the mixing characteristics through animation and estimation of stress generation were made possible. By easily changing the rotation speed, shape of the mixing machine, and material properties within the model, the formation of a database correlating stress generation with spores due to input conditions was facilitated.

Research on functional extension of building demolition simulation tool

In this study, the function extension of a self-developed building demolition simulation tool was conducted. The extension policy involved introducing structural analysis and applicability to partial demolition. In the case of structural analysis, attempts were made to assess the structural safety during demolition by exporting the structural model of the demolished building to structural analysis software and conducting analysis against crushing loads by machinery. Software such as Opensees and Calculix were considered for structural analysis platforms. Regarding partial demolition, attempts were made to predict the generation loads such as noise, vibration, and dust, and estimate the impact on building occupants in non-demolition areas. By enabling spatial acoustic analysis using acoustic analysis software Actran (produced by MSC Software Corp.), it became possible to estimate the propagation of sound waves due to impact during demolition.

Structural Engineering

Kazuhiro KITAYAMA

1. Axial Collapse Mechanism for Reinforced Concrete Beam-Column Joint Failing in Joint Hinging

KITAYAMA Kazuhiro and Jin Kiwoong (Meiji University)

Collapse of buildings is induced by a loss of ability for sustaining vertical loads due to dead and live loads. These vertical loads are carried mainly by columns, which are divided into two parts, i.e., a region along clear height and its upper and lower beam-column joint regions. Collapse of reinforced concrete (R/C) buildings subjected to past earthquakes has occurred in Japan by a sway mechanism in a particular story caused by column shear failure or flexural failure at a top and bottom of columns. Many buildings, however abroad, suffered collapse due to a loss of axial load capacity at beam-column joints (Moehle 2003, Park and Mosalam 2013). Those buildings had unconfined beam-column joints without hoops or small column sections, being different from usual R/C buildings in Japan.

However, almost the whole collapse occurred in Japan for a R/C five-story city office building during Kumamoto Earthquake in 2016 due to axial failure at beam-column joints located in a perimeter frame (Mukai 2016), which was designed according to old seismic provisions in Japan. Beam-column joints in the building seemed to fail in joint-hinging prior to axial collapse (Saito, Mukai and Shiohara 2018). The analytical study indicated later that the joint-hinging failure occurred not under uni-directional loading during the earthquake, but under bi-directional loading (Inoue, Kitayama et al 2022).

Beam-column joints in the perimeter frame of the five-story city office building, where three beams frame into the joint region, damaged heavily during the earthquake. Such behavior leading to axial collapse after joint-hinging failure at this type of a beam-column joint is not investigated at all. Therefore, tri-directional loading tests to R/C perimeter column-beam subassemblages with three beams were carried out in the Academic Year 2022 to study axial collapse mechanism after joint-hinging failure in the beam-column joint.

Specimens with a half scale to actual buildings were designed to yield in beams under uni-directional lateral loading, but to fail in joint-hinging under bi-directional lateral loading, which is the same mechanism as that for the city office building collapsed by Kumamoto Earthquake. Column and beam sections, the span length and the height in the specimens are common to those in recent tests conducted by the authors to facilitate comparison with each test result. Test parameters are the arrangement of joint lateral hoops (three D6 hoops and six D4 hoops in the beam-column joint region), the arrangement of column longitudinal bars (8-D16 and 8-D13) and a number of framing beams into the joint, i.e., a corner column-beam joint with two beams orthogonal to each other and a perimeter column-beam joint with three beams. Conclusions drawn from the perimeter

column-beam subassemblages and the corner column-beam subassemblages are shown respectively.

Test to perimeter column-beam subassemblage with three beams;

All specimens reached a peak lateral capacity at a story drift angle of 1.5% accompanied by tensile yielding of beam and column longitudinal bars and joint lateral hoops. The story shear force at a story drift angle of 1.5% under uni-directional loading reached the expected beam yield capacity by the section analysis assuming that plane sections remain plane. This indicates that beam flexural yielding occurred under uni-directional loading. The resultant shear force under bi-directional loading succeeding to uni-directional loading reached the expected joint-hinging capacity at a south-west loading point and north-east loading point in a horizontal plane where the top of a column moves as depicting a rectangular shape, showing joint-hinging failure under bi-directional horizontal loading.

Compressive yielding of column longitudinal bars and crushing of cover concrete in an upper part of the beam-column joint region, for all specimens, caused a decrease in the lateral resisting capacity at a story drift angle of 2% in a longitudinal direction parallel to the cruciform beam-column subassemblage with two beams opposite to each other.

After a story drift angle of 3%, the beam-column joint went towards axial collapse accompanied with spall-off of cover concrete, crushing of core concrete, and buckling of the column bars placed at a south side of the joint without a framing beam. Conclusions are summarized as follows.

(1) When the total sectional areas of joint lateral hoops are almost same among the specimens, axial collapse did not occur at the perimeter column-beam joint with six D4 hoops, but occurred at the joint with three D6 hoops. Closely-distributed lateral hoops placed in the beam-column joint region contributed to preventing axial collapse in the joint.

(2) An increase in a diameter of column longitudinal bars from 13 mm to 16 mm resulted in restraint of column bar buckling. This mitigated damage to the beam-column joint, and delayed joint axial collapse.

Test to corner column-beam subassemblage with two beams orthogonal to each other;

A corner column-beam subassemblage specimen called F5, which had closely-distributed joint hoops (six D4 hoops), was tested under tri-lateral loading. Test results for Specimen F5 were compared with those for Specimens F3 and T1 which had same configuration and reinforcing bar arrangement as F5 except for having sparsely-distributed joint hoops (three D6 hoops). All specimens resulted in beam yielding till reaching peak lateral capacity. However, the beam-column joint failed in joint-hinging under horizontal bi-directional loading.

Peak lateral capacity at a story drift angle of 1.5%, where joint-hinging failure occurred, was almost same among three specimens. Hereafter at a story drift angle of 3%, lateral residual capacity under bi-directional loading for Specimen F5 with closely-distributed joint hoops exceeded

that for Specimen F3 with sparsely-distributed joint hoops.

The onset of buckling in column longitudinal bars at a beam-column joint was delayed due to confining action provided by closely-distributed joint hoops, which prevented the rotation angle of the upper column relative to the lower column at a joint region from increasing severely. Placing lateral hoops closely in a joint was effective to prevent both decay of lateral-load-carrying capacity after joint-hinging failure and axial collapse at the joint.

2. Re-study on Earthquake Resistant Performance of Reinforced Concrete Beam-Column Joint Judged Previously to Fail in Shear

KITAYAMA Kazuhiro

It had been conceived to be a common sense that a beam-column joint in reinforced concrete moment-resisting frames fails in excessive shear until a joint-hinging mechanism caused by bending moment acting at the joint was proposed by Dr. Shiohara Hitoshi in the early 21st century. When a large amount of beam and column longitudinal bars is intentionally arranged for beam-column frames in a laboratory test, the beam-column joint may fail in shear accompanied by crushing of core concrete in the joint before yielding of beam or column longitudinal bars. In usual seismic design for R/C frames, however, beam or column longitudinal bars yield preceding beam-column joint failure. In even such a case diagonal cracks in a beam-column joint opened widely with an increase in deformation of the frame, cover concrete in the joint spalled off under cyclic load reversals, and then heavy damage concentrated on the joint for many previous tests. This phenomenon had been called “joint shear failure after yielding of longitudinal bar.” If previous test results are re-examined from a point of present view, heavy damage to many beam-column joints may be attributed to not shear but bending moment resulting in joint-hinging failure.

Cyclic reversed loading tests were carried out by Kitayama in the late 1980s using cruciform beam-column subassemblage specimens designated as B2 and B4 whose beam-column joints were judged to fail in shear after yielding of beam longitudinal bars. Test results for the specimens were then reviewed, and earthquake resistant performance was re-studied. Specimens B2 and B4 had different beam, column and joint reinforcement, but a column-to-beam strength ratio of approximately 1.4 for ultimate bending capacity was common for two specimens.

Beam longitudinal bars, joint lateral hoops and column longitudinal bars yielded in turn for both specimens. Lateral resisting capacity reached the peak value at a story drift angle of 4%, and after then descended gradually. X-shaped diagonal cracks and spall-off of cover concrete were observed in the beam-column joint region. Both specimens were judged to fail eventually in joint-hinging.

Deformation capacity and lateral load-carrying capacity corresponding to cracking, yielding of longitudinal bars and joint-hinging failure for the cruciform column-beam subassemblage,

which were evaluated using Dr. Kusuhara's proposals, agreed well with test results.

3. Earthquake Damage and Seismic Resistant Performance for Seismically Retrofitted R/C Buildings

KITAYAMA Kazuhiro

For two reinforced concrete (R/C) school buildings which suffered moderate damage during the 2011 East Japan Earthquake regardless of completion of seismic retrofit, push-over and earthquake response analyses were carried out to study seismic resistant performance and earthquake behavior. One object for the analysis is a four-story building in Tsurugaya Junior-High School located in Sendai City and built in 1973. This class-room building had been seismically retrofitted using steel-braced frames, increment of a sectional area for a column and R/C shear walls. Another object is a three-story building in Akutsu Elementary School located in Takanezawa Town near Utsunomiya in Tochigi Prefecture and built in 1973. This had been seismically retrofitted using steel-braced frames and R/C winged-walls attached to columns.

Three-dimensional frame analyses were conducted through nonlinear computer program SNAP Ver.8 assuming rigid floors. The Ai-type distribution was used as the lateral load distribution along a building height for a push-over analysis. An earthquake motion recorded at K-net Sendai Observatory (982 gal in EW direction and 1517 gal in NS direction) and K-net Haga Observatory (1196 gal in EW direction and 790 gal in NS direction) was input to Tsurugaya building and Akutsu building respectively for an earthquake response analysis. Findings obtained by the study are shown for respective buildings.

A four-story building in Tsurugaya Junior-High School;

A base-shear coefficient of 0.65 in the longitudinal direction was obtained by a push-over analysis, forming beam-yielding mechanism. Maximum drift angles of each story ranged from 0.51% to 0.66% in the longitudinal direction for an earthquake response analysis. Shear failure of a column adjacent to the steel-braced frame and yielding of columns in the fourth story developed for the analysis, which overestimated an actual damage from the Earthquake.

A three-story building in Akutsu Elementary School;

Shear capacity in the first and second stories for the retrofitted building was enhanced to 2.4 time that for an original building. Shear capacity in the third story was 2.0 times greater than that for an original building due to R/C winged-wall installation. A maximum drift angle of the first and second stories obtained by an earthquake response analysis was reduced to 0.43% and 0.59% respectively. In contrast, a maximum drift angle of the third story retrofitted by winged-walls increased to 2.64%. This was caused by the weak stiffness and early yielding of longitudinal bars in columns in the third story relative to the first and second stories.

Shear failure for boundary beams between coupled shear walls was not reproduced for the

analyses in the transverse direction. A torsional crack occurred with shear cracks to the beams during the actual Earthquake. This shear-torsion interaction for the beams may cause a descent of ultimate shear capacity.

4. Original Earthquake Resistant Performance of Memorial Cathedral for World Peace in Hiroshima

KITAYAMA Kazuhiro

Memorial Cathedral for World Peace, which consists of R/C frames and walls with a steel roof, was designed by Murano Togo and built in 1954 in Hiroshima City. Dr. Naito Tachu, a professor at Waseda University, conducted structural design. The cathedral was registered as national important cultural property in 2006. A nave of the cathedral was seismically retrofitted in 2019 by an increase in the thickness of R/C shear walls and installation of steel shear walls with an opening.

Handwritten materials such as structural calculations and drawings by Naito Tachu is preserved by Prof. Emeritus Yamada Makoto at Waseda University. A structural design concept and earthquake resistant performance provided originally by Naito Tachu are mentioned hereafter on the basis of these materials.

A nave of the cathedral was designed to resist earthquake-induced lateral load whose ratio to the gravity load of the building due to the total own weight, i.e., a lateral seismic coefficient, was 0.25. The Building Standard Law of Japan promulgated in 1950 required the allowable stress design using a lateral seismic coefficient of 0.20. Naito Tachu adopted the seismic load 1.25 times greater than that provided by the Standard through keen insight derived from his plentiful career.

Naito Tachu allocated earthquake-induced lateral load to each frame of the nave with a sharing-load proportion which he conceived. Then required sectional area and arrangement for steel bars of columns, beams and walls were decided based on a short-term allowable stress design. The nave consists of fourteen beam-column frames, cantilever columns and walls in the transverse direction. Then lateral load-carrying capacity for each frame was evaluated on a basis of respective collapse mechanism obtained by the author. A sharing-load proportion of each frame taken by the computation coincided almost with that conceived by Naito Tachu. A base shear coefficient at forming collapse mechanism was 0.32 in the transverse direction. However, earthquake horizontal load induced at a central zone of the nave cannot carry over to multi-story shear walls at the end of the nave because the roof is not rigid which consists of vulnerable steel-angled members. The base shear coefficient, therefore, was reduced to 0.22, which is considered to be poor as the ultimate load-carrying capacity.

Jiro TAKAGI

Toshikazu KABEYASAWA

An evaluation of the strength of the reinforced concrete multi-story wall under tensile force
This research was conducted under Building Standards Development Promotion Project of MLIT 2024. Loading tests were conducted on seven scaled wall specimens, two wall specimens partially extracted from the wall frame, and column-wall frame and coupling wall frames. It verified the accuracy of frame analysis using proposed shear stiffness evaluation model that takes into account the correlation between axial force and shear force. It summarizes future issues in multi-story shear wall in structural design.

Investigation of damage to buildings caused by the Noto Peninsula Earthquake

We investigated the tsunami damage to buildings mainly in Noto Town and Suzu City, which were severely damaged by the Noto Peninsula Earthquake that occurred on January 1, 2024. We investigated inundation depth, damage patterns to buildings, and tsunami loads on damaged buildings. Earthquake damage surveys of school buildings were conducted in Nanao City and Suzu City. The survey results were published on the website of the Architectural Institute of Japan Disaster Committee and also presented at the Urban Environment Forum.

A study on damage to buildings during the Great Kanto Earthquake

We analyzed the contents of the "Architectural Magazine", "Japan Society of Civil Engineers Earthquake Damage Survey Report", and "Earthquake Disaster Prevention Investigation Committee Report No. 100" regarding the damage to buildings caused by the Kanto Earthquake that occurred in 1923. The ideological intentions of the investigator and reporter are reflected in the investigation report compared to recent damage investigation reports. The survey results are presented at the AIJ Annual Conference Disaster PD

A study on analytical accuracy of fluid analysis using Open FORM

Using the two-dimensional fluid analysis program Open FORM, we performed a simulation of the water level and wave pressure measured in a hydraulic test with a solitary wave on a standing reinforced concrete wall. The water levels and wave pressures show generally good correlation with the test result. The accuracy of wave pressure at low level and time duration of wave pressure at low points was not sufficient. We also conducted a parameter study in which the wave period was varied.

A study on the analytical response of six story wall frame building using axial shear model

An axial shear model was used to analyze the results of a past shaking table test on a full-scale six-story reinforced concrete building. In the existing three-column model for Ai external force distribution, the response shear force of the second-floor wall reached the average Hirose type shear strength. The axial shear model showed that the shear compression failure of the first-floor wall occurred first, which is consistent with the results of the shaking table test.

Noriko TAKIYAMA

Mechanical properties of post-installed lattice walls to improve the seismic performance of existing wooden houses.

Noriko TAKIYAMA

To create demand for locally produced timber and to strengthen existing wooden houses against earthquakes, we proposed the use of "post-installed lattice walls", in which latticework made of locally produced timber is inserted into existing framework, and we are working on a project to study this seismic behavior. In previous studies, static loading tests were conducted on five lattice frames (framework, full wall, hanging wall, hanging-spandrel wall, and spandrel wall) made of grading timber. The results of these experiments were compared, and differences in reinforcement effects due to lattice installed position were discussed. In this year, a method to avoid lattice cracking, occurred in the previous study, was proposed and static loading tests were conducted on one spandrel frame.

Seismic Behavior of Joints of Existing Wooden Frame with Reinforced by Aramid Fiber Sheet

Noriko TAKIYAMA

High-performance aramid fiber sheets are a new class of composite materials made up of weaved polyamide fibers. In this study, the seismic performance and failure behavior of timber column-ground sill joints reinforced with aramid fiber sheets were investigated. In a past study, we conducted many bending tests under cyclic loading for three column-ground sill specimens. After reinforcing the specimens with aramid fiber sheets, the joint strength improved but was dependent on the method of attaching the sheet. It was found that the seismic property is unstable because of many failure modes. So, we proposed an improvement in the method of attaching the fiber sheet to the joint. Then, we used vertical splitting sheet, to stabilize the failure mode and to improve deformation performance. Therefore, we could control the failure of column-ground sill joints. We have kept to conduct the loading test of full-scale frame, to understand seismic property of frame, and tried to construct analysis model. In this year, we clarified the relationship between braid arrangement and mechanical properties when split sheets are replaced by braids.

Seismic Property of Traditional Wooden House

Noriko TAKIYAMA

The Odatsuki district in Fukushima prefecture, which was registered as an IPDGHB (Important Preservation District for Groups of Historic Buildings), contains many traditional mad-walled townhouses. The purpose of this study was to analyze the structural and vibration characteristics of mad-walled townhouse in Odatsuki district, by investigation existing townhouses and loading test of real scale frame. Therefore, those obtained data were analyzed and design values for the shear forces of sheathed mud-walls were proposed. In this year, we confirmed the defects when the proposed design method was applied to an actual building.

Kazushige YAMAMURA

Environmental Engineering

Akihiro NAGATA

A Study on the Performance of Air Curtain

Akihiro NAGATA

As overall building insulation performance improves, the percentage of outdoor air load is increasing, and emphasis is being placed on reducing outdoor air load. Air curtains have long been used as a measure to reduce outdoor air loads, but knowledge of their effectiveness is not yet sufficient. In this study, the thermal and airflow interception performance of air curtains has been investigated through experiments and numerical simulations. This year, we conducted CFD simulations on airflow characteristics when push-pull type air curtains were applied to take-out delivery ports, and obtained a basic understanding of airflow characteristics.

A Study on Biophilic Design

Akihiro NAGATA

We conducted an actual measurement on indoor greening for a purely wooden high-rise training facility in Yokohama, Japan. In particular, the planar distribution of spectral radiation was measured during daytime and nighttime in a green-ceilinged space, and PPFD was obtained to evaluate it in terms of plant growth. The changes in leaf irradiance over time were also measured using an illuminance meter suspended from the ceiling. Annual simulation of the light environment

using Radiance showed that it is difficult to guarantee sufficient light for ceiling greening by natural light alone, and that additional artificial lighting is necessary.

Masayuki ICHINOSE

(1) Practical research on architectural facades and equipment systems that improve solar radiation and energy balance structures in buildings and cities (internal basic research funds, internal inclined research funds)

Focusing primarily on large-scale urban buildings, we studied the architectural facades and systems necessary to improve the quality of indoor and outdoor environments while suppressing energy consumption. Information such as drawings about existing buildings in Japan and abroad, automatically recorded data such as energy consumption, indoor environment, equipment operating status, etc., evaluation of building users' impressions of indoor environment, etc., and weather data for the location where the building is located. We collected information and statistically analyzed the factors that affect the environmental performance of buildings. The aim is to increase the number of samples by collecting data over a long period of time, and to construct a highly reliable and transparent database and evaluation method regarding the environmental performance of buildings after completion.

(2) Balancing the view from the window space and the thermal and visual environments in high-rise buildings (Shimizu Corporation/Nikken Sekkei joint research)

We developed and verified an air conditioning lighting window control system using airflow windows and motion cameras with built-in automatic control blinds, which is scheduled to be introduced in a large-scale 250,000m² high-rise office building (tentatively named Shibaura Project) scheduled to be completed in the city center in 2025. In a mock-up laboratory installed on the rooftop of Shimizu Corporation and equipped with facade systems equivalent to those scheduled to be installed in an actual building, we conducted a study on the indoor physical environment, health, and intellectual productivity of approximately 200 subjects. We conducted an analysis of the correlation and evaluated the energy-saving performance of window control. These results will be reflected in the operational stage after completion of construction.

(3) Investigation of ZEB achievement cases for ZEB design (Takenaka Corporation contract research)

We investigated the construction-related measures (building performance standards, green building certification, etc.) that are being promoted in countries and regions around the world toward carbon neutrality. The targeted introduction of renewable energy is highly influenced by factors other than climate (fossil energy sources, policies), but climate is the dominant factor in controlling energy

consumption, and the influence of building envelope performance and air conditioning equipment efficiency is high. is high.

(4) Research on elemental technologies of BIM-FM (FM system joint research)

Although the building stock is increasing, the number of maintenance engineers is decreasing, and proper maintenance and management in the future is in a critical situation. This research focuses on using BIM to treat existing buildings as virtual twins and constructing the database necessary for maintenance and management.

This year, case studies were conducted on Thai Red Cross Hospital and Tokyo Metropolitan Housing. We constructed a maintenance BIM using BIM for design and construction, architectural drawings, etc., evaluated and analyzed the differences between the two using LOR (Level of Realism), and proposed a workflow for efficient maintenance management.

(5) Verification of efficiency in architectural design, construction, and operation through information linkage between the comprehensive building management system and BIM (Azbil/Nikken Sekkei/FM system joint research)

In general, when a building is designed and when it is in operation, discrepancies in assumptions about weather conditions, human behavior, etc. cause a performance gap, a discrepancy between expected performance and actual performance. This can be solved by using the PDCA cycle through commissioning, but this is hardly ever implemented in existing buildings. The purpose of this research is to create a framework for optimally controlling the entire building using machine learning by linking BMS, which has been introduced in almost 100% of buildings in recent years, with architectural spaces, equipment, components, etc. through BIM. . This year, we conducted a case study on a secondary system using a basic AHU, using IFC's RDF to describe the relationships between systems, media, etc. as semantic data, while referring to Brick Schema, etc.

(6) Verification of the effectiveness of latent heat/sensible heat separation air conditioning systems to reduce air conditioning energy in tropical regions to achieve carbon neutrality (Daikin Industries joint research)

In order to achieve global carbon neutrality in the future, it is essential to develop and popularize air conditioning systems that can handle hot and humid climates. In particular, in Southeast Asia, which has a hot and humid climate, air conditioning is becoming more popular due to economic growth, and carbon dioxide emissions are expected to exceed that of China by 2050. This research aims to develop and verify popular air conditioning systems that separate sensible heat and latent heat, total heat exchangers, etc., and this year, we analyzed the office indoor environment, energy consumption, and employee evaluations of existing air conditioning systems.

(7) Verification of air conditioning and lighting control system using sensors (Nikken Sekkei Encouragement Donation)

The Azbil Fujisawa 103 building is an advanced building that integrates advanced BMS control and equipment/space design. In this study, we mainly verified small-area VAV control using small sensors and Krukov control in which the air conditioner set temperature and lighting color temperature are linked, in a co-working space located on the first and second floors of the building. .

(8) Environmental performance evaluation in housing complex regeneration (JSPS Scientific Research B shared)

We conducted a quantitative evaluation of the indoor environment and energy-saving performance before and after renovation of refined rental housing in Tokyo and Fukuoka. It has been shown that CO₂ emissions have been reduced by around 10-20% over a 30-year period, and it has become clear that medical costs for the elderly can be halved by reducing health risks by improving the indoor environment.

Masayuki OGATA

Mitigating Infection Risks in Urban and Built Environments

To investigate effective countermeasures against respiratory tract infections, we developed a simulated respiratory aerosol generator that can reproduce the respiratory aerosol generated during conversation and evaluate the risk of infection. Using this device, we conducted a full-scale experiment to investigate the effect of the presence or absence of a portable fan on the concentration distribution of respiratory aerosol particles in a simulated office environment. We showed that the operation of a portable fan reduced the concentration of respiratory aerosol particles in the breathing zone of an infected person.

LIST OF RESEARCH ACTIVITIES

Architectural Planning / City Planning

Kenji TAKEMIYA

1. Refereed Papers

ODA Koji, TAKEMIYA Kenji: A feasibility study on estimation of symptom distribution and equipment demand for patients in palliative care units using composition by days before death, AIJ Journal of Technology and Design, Vol. 30, No.74, 305-310, February, 2024, <https://doi.org/10.3130/aijt.30.305>

2. Proceedings of Oral Presentations

ABE Hikaru, TAKEMIYA Kenji: Current Status of Facility Condition and Operation of Psychiatric Day Care Units in A Prefecture, Summaries of technical papers of annual meeting E-1, AIJ, pp.325-326, 2023(in Japanese)

ENOMOTO Risa, TAKEMIYA Kenji: Consideration of facility operation and spatial configuration of an emergency center -For six facilities completed in 2012 or later-, Summaries of technical papers of annual meeting E-1, AIJ, pp.323-324, 2023(in Japanese)

OGAWA Sayaka, SEKI Minako, TAKEMIYA Kenji: Current states of the support system in Japan and analysis of practice cases, -A study on facility planning for restoration and development of parent-child relationships in Children's Homes and Infants' Homes (Part 1)-, Summaries of technical papers of annual meeting E-1, AIJ, pp.193-194, 2023(in Japanese)

SEKI Minako, TAKEMIYA Kenji: Status of utilization of parent-child living training rooms and other facilities at Children's Home A, -A study on facility planning for restoration and development of parent-child relationships in Children's Homes and Infants' Homes (Part 2)-, Summaries of technical papers of annual meeting E-1, AIJ, pp.195-196, 2023(in Japanese)

HISAKAWA Mami, TAKEMIYA Kenji: Utilization analysis of the community center in Machida City, Case study of 4 buildings with different facilities, Summaries of technical papers of annual meeting E-1, AIJ, pp.483-484, 2023(in Japanese)

AKIBA Daichi, KOIKEDA Masaki, TAKEMIYA Kenji: Characteristics of the spaces for medical team in hospitals according to questionnaire survey of design firms, Study on characteristics and utilization of the space that supports medical team in hospitals (Part 1), Summaries of technical papers of annual meeting E-1, AIJ, pp.307-308,

2023(in Japanese)

KOIKEDA Masaki, TAKEMIYA Kenji: Behavioral observation surveys of dedicated spaces for medical team, Study on characteristics and utilization of the space that supports medical team in hospitals (Part 2), Summaries of technical papers of annual meeting E-1, AIJ, pp.309-310, 2023(in Japanese)

ODA Koji, TAKEMIYA Kenji: Study on estimation of the distribution of medical condition and demand for equipment for patients admitted to a palliative care unit using survival distribution of inpatients, Summaries of technical papers of annual meeting E-1, AIJ, pp.297-298, 2023(in Japanese)

NAKAGIRI Haruka, TAKEMIYA Kenji: A study on drafting and practical rooms suited for architectural design education, Case study of universities in Kanto region, Summaries of technical papers of annual meeting E-1, AIJ, pp.223-224, 2023(in Japanese)

TANAKA Yuuki, TAKEMIYA Kenji: Consideration of the management and spatial use of “Fureai-ikiiki Salon” supplying meals in Tama City, Summaries of technical papers of annual meeting E-1, AIJ, pp.133-134, 2023(in Japanese)

SUNAMURA Mina, IIDA Anju, TAKEMIYA Kenji: Comparative analysis of facility planning and management of hospital wards based on questionnaires in 2000 and 2022, A study on facility planning for palliative care units part 1, Summaries of technical papers of annual meeting E-1, AIJ, pp.301-302, 2023(in Japanese)

IIDA Anju, TAKEMIYA Kenji: Assessment by ward management and ward operation and utilization, A study on facility planning for palliative care units part 2, Summaries of technical papers of annual meeting E-1, AIJ, pp.303-304, 2023(in Japanese)

Tohru YOSHIKAWA

1. Refereed Papers

Urara MIKASA, Ryo SANUKI, Tohru YOSHIKAWA, RESEARCH OF THE LOCATION TENDENCY OF “MACHI-LIBRARIES”, Journal of Architecture and Planning (Transactions of AIJ), Vol.89, No.817, pp.526-535, (in Japanese), 2024.

Takuya Kusunoki, Tohru Yoshikawa, The distribution structure of medical and care resources based on regional characteristics throughout Japan in 2020, BMC Health Services Research, Vol.24, Article No.222, 2024.

2. Proceedings of Oral Presentations

KIMURA Miyu, YOSHIKAWA Tohru, SANUKI Ryo, Influence of the street environment on the occurrence of traffic accidents in residential areas, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.1135-1136, (in Japanese), 2023.

TAKENAKA Hayato, YOSHIKAWA Tohru, Reduction of Traffic Accidents and Changes in Traffic Flow with the Introduction of Automated Driving Vehicles in Itinomiya City, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.931-932, (in Japanese), 2023.

KUSUNOKI Takuya, YOSHIKAWA Tohru, SANUKI Ryo, Analysis of Regional Differences in The Medical Plans Focusing on the Description of "Regional Medical Visions" -Using Data on Regional Characteristics and the Distribution of Medical and Long-term Care Resources in Prefectures and Secondary Medical Areas-, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.877-878, (in Japanese), 2023.

TSUNODA Masaki, Yoshikawa Tohru, Multi-objective optimization of the location of facilities and the size of facilities based on the user's utility and the maintenance cost of facilities and public transportation, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.855-856, (in Japanese), 2023.

MOMMA Tomoya, YOSHIKAWA Tohru, SANUKI Ryo, Proposal of a bus stop location model considering slope load in automobile-dependent areas, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.851-852, (in Japanese), 2023.

KATO Jiku, YOSHIKAWA Tohru, SANUKI Ryo, Survey Research on the Actual Condition of Tentative and Phased Utilization of Closed Schools-Focusing on Kanagawa and Toyama Prefectures-, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.31-32, (in Japanese), 2023.

YOSHIKAWA Tohru, Totalized value assessment in regional public building removal scenarios assuming distance decay of utilization, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Architecture System and Management, pp.201-202, (in Japanese), 2023.

Takuya Kusunoki, Tohru Yoshikawa, The Distribution Structure of Medical and Care

Resources Throughout Japan in 2020, Proceedings of 2023 International Conference of Asian-Pacific Planning Societies, pp.1107-1111, 2023.

Tohru Yoshikawa, Evaluation of Regional Public Buildings by Aggregated Indexes Considering Removal Scenarios Assuming Distance Decay of Utilization, Proceedings of 2023 International Conference of Asian-Pacific Planning Societies, pp.475-483, 2023.

3. Others

3-2 Research Reports

YOSHIKAWA Tohru, Urban Planning Issues for Realization of Appropriately Sustainable Condominiums, Are Condominiums Negative Real Estate? Symposium Proceedings of the Architectural Institute of Japan, Research Committee on Architecture System and Management, Architectural Institute of Japan, pp.69-70, (in Japanese), 2023.

Akiyo Hattori, Tohru Yoshikawa, Ryo Sanuki, A Comparison of Convenience in Private Activities between Local City and Urban City, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.96-102, (in Japanese), 2023.

Kota Watanabe, Tohru Yoshikawa, Optimal location of cycle-and-bus-ride bicycle parking lots, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.90-95, (in Japanese), 2023.

Yukiya Nishijima, Tohru Yoshikawa, A Study on Evaluation of Circulation in Shopping Behavior, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.83-89, (in Japanese), 2023.

Ayana Tamura, Tohru Yoshikawa, Ryo Sanuki, A Study on Appropriate Placement of Public Smoking Areas in Urban Areas, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.76-82, (in Japanese), 2023.

Akeniwa Takumi, Tohru Yoshikawa, Ryo Sanuki, A multitemporal comparative analysis of the relationship between vacant dwellings numbers and regional characteristics by multiple regression analysis, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.111-116, (in Japanese), 2023.

Weifan Guo, Tohru Yoshikawa, Ryo Sanuki, A study on the communication between students and shared space on Chinese university campuses, Reports of the City Planning Institute of Japan, Vo.22, No.1, pp.103-110, (in Japanese), 2023.

3-3 Manuals / Reviews

YOSHIKAWA Tohru, Playing speed of Tama New Town, Studies on Tama New Town, No.25, pp.110-112, (in Japanese), 2023.

Motoki TORIUMI

Masumi MATSUMOTO

Ryo SANUKI

1. Refereed Papers

1. Urara MIKASA, Ryo SANUKI, Tohru YOSHIKAWA : RESEARCH OF THE LOCATION TENDENCY OF “MACHI-LIBRARIES” : Case study in Tokyo, Kanagawa, Osaka, Hyogo, Proceedings of the Architectural Institute of Japan, Vol.89, No.817, pp.526-535, 2024.3

2. Proceedings of Oral Presentations

1. Ayaka Tamura, Tohru Yoshikawa, Ryo Sanuki : A Study on Appropriate Placement of Public Smoking Areas in Urban Areas, Reports of City Planning Institute of Japan, Vol.22, pp.76-82, 2023.6
2. Akiyo Hattori, Tohru Yoshikawa, Ryo Sanuki : A Comparison of Convenience in Private Activities between Local City and Urban City : Focusing on Reachability with Consideration of Travel Time, Reports of City Planning Institute of Japan, Vol.22, pp.96-102, 2023.6
3. Weifan Guo, Tohru Yoshikawa, Ryo Sanuki : A study on the communication between students and shared space on Chinese university campuses, Reports of City Planning Institute of Japan, Vol.22, pp.103-110, 2023.6
4. Takumi Akeniwa, Tohru Yoshikawa, Ryo Sanuki : A multitemporal comparative analysis of the relationship between vacant dwellings numbers and regional characteristics by multiple regression analysis : Focusing on municipalities in Kanagawa Prefecture, Reports of City Planning Institute of Japan, Vol.22, pp.111-116, 2023.6
5. Jiku Kato, Tohru Yoshikawa, Ryo Sanuki : Survey Research on the Actual Condition of Tentative and Phased Utilization of Closed Schools - Focusing on Kanagawa and Toyama Prefectures, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.31-32, 2023.9
6. Tomoya Monma, Tohru Yoshikawa, Ryo Sanuki : Proposal of a bus stop location model

considering slope load in automobile-dependent areas, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.851-852, 2023.9

7. Takuya KUSUNOKI, Tohru YOSHIKAWA, Ryo SANUKI : Analysis of Regional Differences in The Medical Plans Focusing on the Description of “Regional Medical Visions” - Using Data on Regional Characteristics and the Distribution of Medical and Long-term Care Resources in Prefectures and Secondary Medical Areas, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.877-878, 2023.9
8. Miyu Kimura, Tohru Yoshikawa, Ryo Sanuki : Influence of the street environment on the occurrence of traffic accidents in residential areas, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.1135-1136, 2023.9
9. Kasane YUASA, Ryo SANUKI, Shih-Hung YANG, Bingyu SUN : A Study on Agricultural Utilization of Public Space in Urban Areas - A Case Study of Kaohsiung City, Taiwan, Proceedings of the Conference of Kanto Branch, Japanese Institute of Landscape Architecture, pp.63-64, 2023.12

3. Others

1. Shin Aiba, Kennichi Yabuki, Hiroki Nakajima, Ryo Sanuki, etc. : Keyword Encyclopedia for Urban Students - 24 themes for the future, Gakugei Shuppansha, 2023.9

Architectural Design and History

Masao KOIZUMI

Yoshihiko ITO

1. Refereed Papers

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2. Proceedings of Oral Presentations

as the first author

- Yoshihiko Ito, "Viajes e inspiraciones de Domènech i Montaner: apuntes sobre la colección de postales de su familia en el archivo histórico del COAC," (Congrés Domènech i Montaner, Fundació Antoni Tàpies, Barcelona. 2023.4.29. (in Spanish)

- Round Table "On *Art in Spanish Empire: Artistic Circulations and Transformations* (Tokyo, 2022)" organized by Collegium Mediterranistarum. Explanation of aim and the presentation "From Great Mosques to Cathedrals" 2023.5.20 online (in Japanese)
- Yoshihiko Ito, "On the Domènech i Montaner Postcards Collection of the Col·legi d'arquitectes de Catalunya (COAC)," Annual Congress of Architectural Institute of Japan. 2023.9.15 at Kyoto University. (in Japanese)
- Yoshihiko Ito, "Are Domes Oriental? Reconsiderations on Vault and Dome Construction in the Western Mediterranean (4th-10th centuries)," ArchDebates, German Archaeological Institute in Madrid, 2023.11.21. (in Spanish and English)
- Yoshihiko Ito, "(Semi-)Public Spaces in Spain", invited lecture, Ryukoku University, 2024.2.2. (in Japanese)
- Yoshihiko Ito, "Early Medieval Domes in the Western Mediterranean: Architectural Survival or Resurgence?," AFoMedi IV Biennial International Conference, Academia Sinica, Taipei, 2024.3.19.

as the second author (all below were presented during the Annual Congress of Architectural Institute of Japan, 2023.9.13-15)

- Shintaro Umehara & Yoshihiko Ito, "The Composition and Utilization of Semi-Exterior Space in Bangkok, Thailand - Focusing on the History of Urban Formation and Public Character"
- Tomomi Miyagawa & Yoshihiko Ito, "The Construction and Extension of Terminal Stations and the Transformation of Peripheral Urban Organization in London" Young Researchers Best Presentation Award
- Miki Ogawa & Yoshihiko Ito, "Bathrooms in English Residential Architecture of the Late 19th and Early 20th Centuries: Development of Equipment and Changes in Configuration and Design" Young Researchers Best Presentation Award
- Kaede Misawa & Yoshihiko Ito, "Atsumasa Hagiwara, an Architectural Engineer from Taisho to the Early Showa"

3. Others

3-1. Monographs / Technical books

3-2. Research Reports

3-3. Manuals / Reviews

- Yoshihiko ITO, "Isidro G. BANGO TORVISO, *Catedral de Jaca. Un edificio del siglo XI*," *Seiyo Chusei Kenkyu*, vol.15, 2023.12, pp.163-164.

3-4. Works / Products, etc.

Fuminori NOUSAKU

Akira KINOSHITA

3. Others

3-3 books

Construction Management and Building Materials

Makoto TSUNODA

2.Proceedings of Oral Presentations

KAWAMURA Hinako , TSUNODA Makoto , and MATSUMOTO Masumi, Research on the production system for detached houses in renovation by resident, Summaries of Technical Papers of Annual Meeting, AIJ, Architectural Planning and Design, pp.525-526, Sep. 2023 (in Japanese)

YAMAMOTO Takuma, TSUNODA Makoto, A study on design for green wall focusing on exterior design and maintenance, Summaries of Technical Papers of Annual Meeting, AIJ, Architectural System and Management, pp. 595-596 Sep. 2023 (in Japanese)

3. Others

3-3 Manuals / Reviews

Makoto TSUNODA, Toward to the activation of existing buildings, Periodic training programs for Kenchikushi, The Japan Architectural Education and Information Center, pp130-145, Apr.2023(in Japanese)

Yoichiro KUNIEDA

3) List of Research Activities

1. Refereed Papers

None

2. Proceedings of Oral Presentations

1) Yoshinori KITSUTAKA, Masaki TAMURA and Yoichiro KUNIEDA: CO2 Absorption Performance of High-Strength Lightweight Fiber-Reinforced Concrete After Approximately 20 Years -Research on CO2 absorbing concrete-, Summaries of Technical Papers of Annual Meeting, AIJ, Construction Materials, pp.647-648, 2023.7 (in Japanese)

2) Yoichiro KUNIEDA: Basic Study of 4D-CAD Application to Waste Collection, AILCD Conference2024, pp.261-266, 2024.2

3. Others

3-1. Monographs / Technical books

1) Committee on Building Materials and Construction Procedure, Committee on Reinforced Concrete Structures , Committee on JASS5 revision: Japanese Architectural Standard Specification for Reinforced Concrete Work JASS5, AIJ, 2023.7 (in Japanese)

2) Committee on Building Demolition: Recommendations for Demolition Work Reinforced Concrete and Steel Structures, AIJ, 2024.3 (in Japanese)

3-3. Manuals / Reviews

1) Yoichiro KUNIEDA: A Study on Dynamic Analysis Methodology for Demolition and Recycling Load in Pursuit of a Resource Recycling Society, Concrete Journal, Vol.62, No.5, pp.476-481, 2024.5

2) Yoichiro KUNIEDA: Comprehension of Surface Contamination on Concrete Structures, Concrete Journal, Vol.62, No.7, 2024.7 (in press) (in Japanese)

Structural Engineering

Kazuhiro KITAYAMA

1. Refereed papers

none

2. Proceedings for Oral Presentation

(1) KITAYAMA Kazuhiro, MURANO Tatsuya, Inoue Ryo and JIN Kiwoong : Structural Performance Evaluation of 3-Dimensional RC Exterior Column-Beam Joint after Joint-Hinging Failure (Part 1 : Outline of the Test), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 363-364, September 2023 (in Japanese).

(2) MURANO Tatsuya, Inoue Ryo, JIN Kiwoong and KITAYAMA Kazuhiro : Structural Performance Evaluation of 3-Dimensional RC Exterior Column-Beam Joint after Joint-Hinging Failure (Part 2 : Experiment Result and Discussion), Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Structures IV, pp. 365-366, September 2023 (in Japanese).

(3) KITAYAMA Kazuhiro and Ohkouchi Yasuo : Now and Future; Evaluation on Earthquake Resistant Performance of Nuclear Power Facilities, Report for Panel Discussion in Annual Meeting, Architectural Institute of Japan, pp.1-2, September 2023 (in Japanese).

3. Others

3-1. Technical books

(1) Architectural Institute of Japan: Seismic Performance Evaluation Guidelines for Reinforced Concrete Buildings Based on the Capacity Spectrum Method, Nov., 2023 (in Japanese).

(2) Architectural Institute of Japan: AIJ Guidebook on Seismic Performance Evaluation of Structures in Nuclear Facilities, January, 2024 (in Japanese).

3-3. Manuals / Reviews

(1) KITAYAMA Kazuhiro: Annual Report in Kanto Branch, Journal of Architecture and Building Science, Vol.138, No.1779, pp.76, September, 2023 (in Japanese).

(2) KITAYAMA Kazuhiro: Peer Review Results of 2023 Proceedings of the Japan Concrete Institute, Concrete Journal, Vol.61, No.10, pp.939-941, October, 2023 (in Japanese).

Jiro TAKAGI

Toshikazu KABEYASAWA

1. Refereed Papers

1) Yukisato Uchimiya, Toshikazu Kabeyasawa, A study on shear stiffness evaluation of reinforced concrete structural wall subjected to tensile axial loads, Proceedings of

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