

Annual Report

Department of
Architecrure and Building Engineering
Tokyo Metropolitan University

2020

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OVERVIEW OF RESEARCH ACTIVITIES

Architectural Planning / City Planning

Kenji TAKEMIYA

(1) Study on architectural planning of medical facilities

Kenji Takemiya

Medical facilities are constantly changing in response to advances in medical technology and changes in the medical system. This series of studies aims to clarify the current status and problems of medical facilities. This year, remarkable results have been achieved at the following research assignments. 1) Space dedicated to medical staff in hospital, 2) Palliative care unit, 3) Convalescent rehabilitation ward, 4) Emergency department in hospital, 5) Intensive care unit, 6) Neonatal intensive care unit, 7) Management department in hospital

(2) Study on architectural planning of community facilities

Kenji Takmeiya

- 1) We conducted a similar survey to the community center in Tama City, which was conducted in 2019, to clarify the changes in facility usage after spread of COVID-19.
- 2) We conducted a similar survey to the community center in Musashino City, which was conducted in 2018/2019, to clarify the changes in facility usage after spread of COVID-19.

(3) Research on welfare facilities for children and the elderly

Kenji Takemiya

- 1) In Japan, the number of facilities for preventive care is increasing. We conducted an interview survey on facility management and usage of healthy elderly day services in three prefectures, Tokyo and the Tokyo metropolitan area. We have summarized the planning requirements for facility planning.
- 2) Seiji Nii Architect & Associates has been working on the design of facilities aiming for coexistence with the community. We collected materials for the child welfare institution designed by them, conducted an interview survey, and clarified the characteristics of the design method of them.

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, the project deepened the method to quantify walking accessibility considering vertical movement using GIS, and examined the possibility of application to new transportation systems and monorails as analysis objects.

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. Especially in this fiscal year, this project analyzed regional fairness when consumer surpluses and the number of visitors were applied to Tama New Town as evaluation indexes of the social benefit on the facilities whose utilization rate decreases by distance.

Motoki TORIUMI

Masumi MATSUMOTO

Studies on Regeneration and Revitalization of New Towns

Masumi MATSUMOTO

Tama New Town is the largest new town developed over 40 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.

Studies on the Positioning of Interior Design in Housing Design Processes

Masumi MATSUMOTO

Conducted hearings to architects on the design making processes relating to housing designs.

Ryo SANUKI

I am conducting urban planning and urban analysis research using city space analysis method and GIS. I'm also studying Public Facility Management with other researchers or staff from various municipalities.

Architectural Design and History

Masao KOIZUMI

(1) Research on public space in urban area.

Masao KOIZUMI

We proposed a new urban public space on an occasion of exhibition of urban space.

(2) Research on sustainable residential environment under aging society.

Masao KOIZUMI

We researched the planning methods of community facility based on mutual and public assistance under aging and low birth-rate society.

(3) Research on revitalization of downtown area

Masao KOIZUMI

We researched and proposed about new urban design methods, such as utilization of abandoned houses, improving contents for visitors, information transmission to local residents, on declining downtown area of local city.

Yoshihiko ITO

A Study on the Architectural and Urban Impact of the Transformation of Islamic Cities into Christian Ones in the Medieval Iberian Peninsula

Yoshihiko ITO

This study focuses on the transformation of Islamic cities and architecture in the Iberian Peninsula, which was conquered by Christians between the second half of the 11th century and the end of the 15th century. In particular, the focus was on the Great Mosque of Cordoba, a Friday mosque founded by the Umayyads at the end of the 8th century, which was gradually reconstructed as a cathedral after the transition from Islamic to Christian rule.

Jun INOKUMA

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 2020, I have done a field work to see some important examples of modern and contemporary architecture in Aomori.

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 high-level application would be synthesized. In the academic year of 2020, relations between theory and design practice were pursued through a design works of three master program students.

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, I and my research associates have made research survey on architectural conversion abroad. In the academic year of 2020, we published research results on the cities of Taiwan and Canada in some periodical journals. We also made trips to investigate converted buildings in Aomori in October.

Study on Landscape Architecture and City in Early Modern Period

Akira KINOSHITA

In the academic year of 2020, the geometrical composition of Sir John Vanbrugh's architectural works was examined. The geometrical composition of Vanbrugh's works has been said to create a dynamic impression. To analyze such aspect of the building "motion parallax", a concept of visual effect in the field of cognitive science was referred. As the result of analysis, it was clarified that certain composition creates optical illusion of movement. And the possibility of Vanbrugh's intentional manipulation of dynamic composition was inferred.

Construction Management and Building Materials

Yoshinori KITSUTAKA

Influence of High Temperature Heating on the Fracture Properties of Concrete Mixed with Different Coarse Aggregate

Yoshinori KITSUTAKA

Since concrete subjected to high temperature heating can suffer strength loss, it can also be prone to cracking. However, there have been few reports on cracking in concrete under the effect of high temperature heating. This paper reports on the influence of coarse aggregate types on the fracture properties of concrete subjected to high temperatures up to 800°C by using the poly-linear tension softening inverse analysis. Findings are, 1) the fracture surface areas affected by high temperature heating linearly increase as the temperature rises, 2) the maximum load of sandstone on the L-CMOD curve scarcely changes up to 300°C whereas those of other specimens are highest at 100°C, 3) the tension softening curves express generally decreasing cohesive stress with the increase in the COD, the reductions in the cohesive stress of sandstone, granodiorite, and chert take on similar trends, but that of limestone is slightly faster than the other concrete specimens, 4) at a heating temperature of 100°C, the initial cohesive stress of sandstone, granodiorite, and chert slightly increase and that of limestone slightly decreases. At higher temperatures, the initial cohesive stress decrease. 5) up to a heating temperature of 300°C, the fracture energy of all specimen increases but then tends to decrease as the heating temperature increases.

Study on Xonotlite-Based Autoclaved Lightweight Aerated Concrete with Cementitious Materials

Yoshinori KITSUTAKA and Yoichiro KUNIEDA

Autoclaved lightweight aerated concrete (ALC) is a building material with tobermorite as the major constituent mineral, and made by Portland cement, silica and lime. On account of the most striking characteristics of thermal insulation properties and fire resistance, ALC is widely used as walls, floors and roofs. Tobermorite and xonotlite are well known as typical calcium silicate hydrates, in particular, xonotlite has long been used as a heat insulating material for high temperatures. However, it was difficult to synthesize xonotlite using cement because aluminum ions were the factor of inhibiting xonotlite formation and its crystal growth. The authors are aiming to manufacture xonotlite-based ALC using cement as a raw material in order to further improve the thermal stability of ALC. So far, we have studied the autoclaving conditions for the synthesis of xonotlite. In addition, we proposed a method to understand the state of xonotlite formation by measuring the heat shrinkage by thermomechanical analysis (TMA). In this study, the mixing, casting and autoclaving conditions for the production of xonotlite-based ALC were examined.

Development of Risk Estimation System for Building Exterior Wall Repair

Yoshinori KITSUTAKA, Yoichiro Kunieda

With the aim of extending the life of buildings from an environmental and economic point of view, it is of great importance to estimate the future loads for building repairment. Therefore, in this study, aiming at risk estimation throughout the life cycle in building repair, we grasped the pollution properties and physical characteristics of the outer wall of the building and proposed an estimation method by particle method analysis. Specifically, in December, we conducted a field survey of the wall surface with three approaches; i) the degree of pollution from image analysis, ii) the surface texture with a contact angle meter and 3D scanner, and iii) the rainwater flow rate distribution at multiple locations using a flow meter. In addition to this, the simulation of particle analysis was done by incorporating the data obtained by the 3D scanner into 3D CAD data with ParticleWorks. It became possible to visualize rainwater behavior and estimate theoretical physical quantities.

Method for Estimation of Exterior Tile Detachment

Yoshinori KITSUTAKA, Yoichiro Kunieda

There is concern that the exterior tiles will be detached due to deterioration over time, and the risk of peeling off due to external forces such as earthquakes will increase. In this study, we proposed a method to estimate the stress distribution and displacement at the joint mortar part due to the detachment properties of the exterior tile. An impact testing machine is used to generate a dynamic load on a tile specimen that has been artificially detached, and a 3D scanner is used to measure the residual displacement, thereby experimentally clarifying the load-residual displacement correlation.

We also developed a stress and peeling amount estimation tool at tile joints using the programming language Python. The accuracy of estimation with the tool was examined by comparing with the test piece results.

Makoto TSUNODA

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 presented a business system model of resident participation based on the degree of resident's involvement in construction work such as ordering, schedule adjustment, and technical capabilities. When incorporating client construction, it is necessary to clarify the scope of responsibility of the parties involved. We pointed out that the timing of delivery will be one of the important demarcation factors.

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.

In this year, we focused on the cleaning work inside the glass atrium space and clarified the effect of equipment and devices that perform daily work on the internal design. The glass support

method is related to the fitting of the cleaning equipment, which has a considerable influence on the appearance from the inside. On the other hand, it was made inconspicuous due to the design ingenuity of changing the color and size of the support member.

In addition, the impact of the plan renovation of a wooden private house on the opening components was clarified from the viewpoint of construction plan.

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, we focused on the secular change of common facilities in condominiums, and grasped the actual conditions of changes in usage, composition of common facilities, and changes in rules. In addition, we clarified various problems of common facility management in the current condominium management and searched for the requirements necessary for a management and operation method that can respond to future changes over time. It was clarified that the common facilities themselves have not changed in response to changes in the resident class and the area around the condominium over time. It was also shown that the change of shared facilities includes effective utilization by adding functions and improvement by changing functions.

Furthermore, in the management of condominiums centered on shared facilities, it was pointed out again that it is necessary to take a utilization method for secular change based on ingenuity of information sharing and community formation not only by the board of directors but also by all residents.

Yoichiro KUNIEDA

Study on Xonotlite-Based Autoclaved Lightweight Aerated Concrete with Cementitious Materials

Yoshinori KITSUTAKA and Yoichiro KUNIEDA

Autoclaved lightweight aerated concrete (ALC) is a building material with tobermorite as the major constituent mineral, and made by Portland cement, silica and lime. On account of the most striking characteristics of thermal insulation properties and fire resistance, ALC is widely used as walls, floors and roofs. Tobermorite and xonotlite are well known as typical calcium silicate hydrates, in particular, xonotlite has long been used as a heat insulating material for high temperatures. However, it was difficult to synthesize xonotlite using cement because aluminum ions were the factor of inhibiting xonotlite formation and its crystal growth. The authors are aiming to manufacture xonotlite-based ALC using cement as a raw material in order to further improve the thermal stability of ALC. So far, we have studied the autoclaving conditions for the synthesis of xonotlite. In addition, we proposed a method to understand the state of xonotlite formation by measuring the heat shrinkage by thermomechanical analysis (TMA). In this study, the mixing, casting and autoclaving conditions for the production of xonotlite-based ALC were examined.

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load on a tile specimen that has been artificially detached, and a 3D scanner is used to measure the residual displacement, thereby experimentally clarifying the load-residual displacement correlation. We also developed a stress and peeling amount estimation tool at tile joints using the programming language Python. The accuracy of estimation with the tool was examined by comparing with the test piece results.

Optimization of Dismantling Waste Recovery with Algorithms

Yoichiro Kunieda

Unlike during construction, the demolition waste generated during building demolition is difficult to collect as a single waste type due to the scattering of rubble and the mixing of members. As a result, those wastes are sent to an intermediate treatment plant as contaminated waste. It has become a major problem in the industry as an environmental and economic burden. Therefore, in order to reduce the environmental and economic burden during waste collection and treatment, we proposed the optimization of collection efficiency using a mathematical algorithm in this study. By applying the clustering and k-means method to the runway for waste recovery at the time of recovery and comparing the recovery methods for each grade in 3D-CAD. The amount, composition, recovery location of the recovered waste can be estimated over time. Furthermore, by referring to the waste treatment costs and recycled material prices in the five regions of Japan (South Kanto, Hokuriku, Tokai, Kinki and Kyushu), it has become possible to propose optimization based on regional characteristics by comparing costs.

Structural Engineering

Kazuhiro KITAYAMA

1. Axial Collapse Mechanism for Reinforced Concrete Corner Column-Beam 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 failure (Saito, Mukai and Shiohara 2018).

A concept of the joint-hinging failure at a R/C beam-column joint was proposed by Shiohara in 2008. While laboratory tests were begun to investigate the mechanism in detail, a process leading to axial failure from joint-hinging failure in a beam-column joint is not studied except for a few studies such as horizontal load reversal tests to plane exterior beam-column subassemblage specimens under varying axial load (Murakami and Maeda et al. 2017). Actual buildings are subjected to three-directional excitations during an earthquake. A laboratory test was conducted to simulate such actual conditions using a three-dimensional (3D) corner column-beam subassemblage specimen with code-satisfied joint hoops subjected to horizontal bi-directional loads and constant axial load (Katae and Kitayama 2015). In the test, buckling of column longitudinal bars in a beam-column joint region was indicative of joint axial failure. Hassan and Moehle in 2012 and 2013 investigated the limit drift of a R/C frame reaching joint axial failure.

This study, therefore, aims to reveal a mechanism leading to joint axial failure from joint-hinging failure in R/C frames under three-directional earthquake excitations, and estimate the limit drift capacity at joint axial failure for the building. Three 3D corner column-beam subassemblage specimens were tested statically under horizontal bi-directional load reversals and varying axial load. Vertical axial load applied to an upper column was varied from tension with an axial stress ratio of 0.20 to compression with that of 0.13. A number of column intermediate longitudinal-bars and a diameter of column longitudinal bars were chosen as test parameters. Column intermediate longitudinal-bars are conceived to play an important role to prevent joint-hinging failure and sustain column axial load. Concrete compressive strength was approximately 67 MPa.

All specimens reached the peak lateral capacity due to joint-hinging failure at a story drift angle of 1.5%, and thereafter the lateral-load-carrying capacity descended. Axial collapse at a beam-column joint occurred due to a loss of ability for sustaining column compressive load at a story drift angle of 3% or 4% for the 3D subassemblage with every one or two column intermediate bars of a 16mm-diameter respectively, placed at a perimeter zone of the square column section. Axial collapse in a corner column-beam joint was accelerated by column axial load varying from tension to compression and bi-lateral cyclic reversed loads. Crash of joint concrete and local buckling of column longitudinal bars within the joint, placed along column two faces without framing beams perpendicular to each other, caused an abrupt inclination of the upper column to the

lower column, inducing a loss of ability for sustaining vertical load.

When keeping a diameter of column longitudinal bars constant, an increase in a number of column intermediate bars from one to two arranged in an each column face contributed to increasing the story drift angle at the onset of column bar buckling from 2% to 3%, enhancing lateral drift performance for the 3D subassembly and delaying axial collapse at a corner column-beam joint. In contrast, when a total amount of column longitudinal bars is almost equal, even if a number of column intermediate bars increases, a smaller diameter of column longitudinal bars caused premature yielding of both column intermediate bars and joint hoops, and eventually remarkable joint damage. This gave a disadvantage for avoiding joint axial collapse.

2. Evaluation of Flexural Crack Width for Reinforced Concrete Beam

KITAYAMA Kazuhiro

Flexural crack widths for a reinforced concrete (R/C) beam subjected to pure bending moment can be predicted by the quick evaluation method proposed by Suzuki and Ohno in 1981. The proposed method deals with the R/C beam under stable crack propagation. Suzuki and Ohno revealed, however, that the method can be also applied to the beam under unstable crack conditions.

Even if a shear force is provided to a beam with bending moment, a local region with a limited length along the beam having a sufficient shear span length can be regarded as being subjected to almost pure bending moment. In the study, a measured width of flexural cracks developed in a plastic hinge region at the beam end in cruciform beam-column subassembly specimens was compared with that evaluated by the Suzuki and Ohno method. A shear span length in the beam was 1425 mm, and a length of a plastic hinge region was assumed to be equal to the beam depth, i.e., 400 mm or 250 mm.

Beam-column subassembly specimens used in the study were tested by Wang in 2011 and Hu in 2019 in the laboratory. The specimens had a beam depth of 400 mm or 250 mm, and a beam longitudinal bar with a diameter of 13 mm, 19 mm and 22 mm. Concrete tensile strength and secant modulus corresponding to one-third compressive strength ranged from 2.7 MPa to 3.4 MPa, and 174 GPa to 205 GPa respectively. Flexural crack widths were measured by the digital optical scope. The crack at the beam-column interface was excepted in the study because the width is greatly influenced by the pull-out of beam longitudinal bars from a beam-column joint region.

An average space between flexural cracks within a plastic hinge region was scattered widely from 40 mm to 102 mm in the tests, while the evaluated crack space by the Suzuki and Ohno method was 125 mm approximately, which overestimated the test results. Measured average strain along a beam longitudinal bar when reaching a service limit state was equal to or two-thirds that estimated by the Suzuki and Ohno method, showing a good accuracy for the method. A service limit state corresponds herein to the loading state at a residual crack width of 0.2 mm under unloading. An

average crack width measured at a service limit state was 0.65 to 1.36 times that estimated by the Suzuki and Ohno method, showing a wide scatter.

3. Evaluation of Load-Deformation Backbone Curve for Beams in Precast Prestressed Concrete Exterior Beam-Column Unit Frame Assembled by Post-Tensioning Unbonded Tendons

KITAYAMA Kazuhiro and Jin Kiwoong (Meiji University)

To build moment resisting frames, there is a promising construction method that precast concrete beams and columns are connected by post-tensioning unbonded tendons which pass through these members (called unbonded PCaPC frames). For an unbonded PCaPC exterior beam-column subassembly, the backbone curve of load-deformation relationship can be predicted with a good accuracy using a macro-model proposed already by the authors under the condition that flexural ultimate strength of the beam is attained by concrete compressive failure at beam ends without yielding of unbonded tendons. Strength and deflection of the beam can be obtained by the model at a crack opening at the beam-column interface, an elastic limit state where the strain of the tendon on a tension side reaches the elastic limit and an ultimate limit state to reach cover-concrete crushing.

For an unbonded PCaPC exterior beam-column subassembly, the elongation and forces of the tendons on a tensile side are larger than those on a compressive side. Therefore, the tendon strains at the tensile and compressive side on the beam section were taken by the compatibility condition in the axial deformation between the beam and the tendon, as well as the force equilibrium between the concrete and the tendon.

Superiority of the evaluation method proposed by the authors was verified by comparison with evaluation results of previous methods proposed by Pampanin in 2001 and Tsuda in 2015. Strength and deflection at the ultimate limit state were predicted by the authors' method with a good accuracy, whereas previous methods underestimated test results.

A parametric study was conducted to understand the effects of critical design parameters on the performance limits. According to the parametric study, the key design parameters such as the tendon amount, initial prestressing level and tendon distance in a beam section can be rationally determined according to different performance demands.

4. Decision Making Process to Preservation and Renovation for Kyoto Kaikan

KITAYAMA Kazuhiro, TAKEMIYA Kenji, TSUNODA Makoto, KINOSHITA Akira and INOKUMA Jun

Renovation and activation for the Japanese modern architecture which is considered to be worth being preserved as cultural assets are now an important issue, concerned with sustaining the

earth environment. Although a plan to conduct the renovation and activation for existent buildings should be determined through detailed discussions among many stake folders, the decision making process was not investigated sufficiently. The study, then, picked up the Kyoto Kaikan building which was designed by MAEKAWA Kunio, built in 1960 and renovated in 2015 to reveal the decision making process for the plan.

Jiro TAKAGI

Toshikazu KABEYASAWA

A study on out-of-plane flexural strength of reinforced concrete walls

A hydro static test is carried out on two reinforced concrete outer wall specimens at the outside laboratory of Assis Co., Ltd. The test specimens were 1/3 scale with identical reinforcement. One of two test specimens is strengthened by SRF fiber sheet to quantify the performance of strengthened reinforced concrete wall. Water pressure was provided by the general water supply. RC test specimen shows flexural failure with 6.0m water height, and SRF fiber sheet specimen flexural failure with 8.0m water height. The test result demonstrates the improvement of hydro-resistant performance of reinforced concrete walls by SRF fiber sheet strengthening.

A study on base sliding behavior in a shaking test on a full-scale 10-story RC building

The time history response analysis of shaking test on 10-story RC building with sliding base at E-Defense is carried out. The relation between base shear and sliding drift is idealized by bilinear model, in which the effect of bi-directional sliding, vertical ground motion, and uplift of the base foundation are considered. In any analytical model, the maximum story drift of the super structure in the analysis is consistent with the maximum story drift in the shaking test., while the residual or time history drift of the sliding base shows the different responses in between the test and analysis.

A study on reduction of the pile moment in the building with sliding foundation

The moment on the piles is evaluated with modified Penzien model. The superstructure has sliding base foundation and the moment reduces due to the sliding base. The maximum moment of the pile is recorded at the beginning of the base slide, and the reduction rate of the moment is not as low as the friction coefficient. This is due to the inertia force on the mat concrete foundation under the base foundation, the parametric study indicates this inertia force increases especially in low-friction sliding cases.

A study on wave load on the columns using 3D VOF Simulation

The wave pressure on the line of columns is evaluated by 3D-VOF simulation. For the wave pressure on two columns in row with certain interval, the existence of the backward column does not affect on the wave pressure on backside of the front column. For the wave pressure on the several columns in row with certain interval, the wave pressure on the front column is large and the wave pressure on other columns are identical in the simulation.

Noriko TAKIYAMA

Restoring Force Estimation of Japanese Traditional Wooden Structure with SASHIGAMOI

Noriko TAKIYAMA

According to regional characteristics and cultural differences, there are various specifications in SASHIGAMOI joint in Japan. In the limit strength calculation which is one of calculation methods used in the seismic performance evaluation of traditional wooden residents, the shear forces of all earthquake resistant elements are simply added and the restoring force is given for each seismic element without considering the different detail of SASHIGAMOI joint. In past study, to figure out the fracture mode and the restoring force characteristic, we performed cyclic loading test on 4 specimens with same external dimension method but different joint shape. Moreover, we also aimed to construct the evaluation formula to estimate the restoring force and compare with results of experiment. From last year, to simulate the experiment, we modeled the specimens, and compared the results of simulation with the experiment to investigate the accuracy of the simulation. And, we also tried to estimate the restoring force of wooden frame by the proposed estimation method. In this year, based on past study, we tried to propose shear force of the frame with SASHIGAMOI controlled by axial force of SASHIGAMOI.

Restoring Force Estimation of Existing Wooden Frame with Joints 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 mode. 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.

From last year, we have kept to conduct the loading test of full-scale frame, to understand seismic property of frame. In this year, we tried to construct analysis model, and to estimate the shear force of the wooden frame reinforced by splitting aramid fiber sheet.

Seismic Property of Traditional Wooden House in IPDGHB, Fukushima

Noriko TAKIYAMA

The Ouchi-Juku and Maesawa district of the inland Fukushima prefecture, which was registered as an IPDGHB (Important Preservation District for Groups of Historic Buildings), contains many traditional thatched houses. A low-five-intensity earthquake on the Japanese seven-stage seismic scale was recorded near these preservation district; nevertheless, none of the thatched houses suffered any damage. Hence, it is very important to understand their construction and structural characteristics. The purpose of this study was to analyze the structural and vibration characteristics of a thatched house in Ouchi-Juku and Maesawa district, and to obtain seismic behavior of warehouse by investigation the mud-wall townhouses in Kitakata city.

Kazushige YAMAMURA

Environmental Engineering

Akihiro NAGATA

A Study on the Performance of Air Curtain

Akihiro NAGATA

- (1) We performed full scale model experiments in order to clarify the influence on people and their wearing by air curtain flows using marker-based image processing taken with a high-speed camera.
- (2) We introduced the power-law model for the pressure drop loss caused by air curtain and investigated the method to incorporate air curtain into ventilation network calculation.

A Study on Induction Ventilation through Openings

Akihiro NAGATA

1/2 Scale Model Experiments and Performance Evaluation of Induction Ventilation Devices were conducted.

Masayuki ICHINOSE

- (1) Practical Study on Building Façade and MEP for Improving Balance of Solar Radiation and Energy in Urban Area
- (2) Element Technology of Sustainable Building for Local Climate and Culture All Over the World
- (3) Commissioning and BIM Utilization for Advanced HVAC System
- (4) Environmental Performance Evaluation for Revitalization of Housing Complex

Masayuki OGATA

Infection risk mitigation in urban and built environments

In the study of effective and sustainable countermeasures against new coronavirus infections, we identified effective countermeasure methods based on exposure to aerosol particles, including aerosol and micro-droplet transmission in addition to conventional droplet, contact, and airborne transmission. We conducted an experiment to evaluate exposure to aerosol particles using a cough simulator, and experimentally clarified the effects of maintaining a physical distance between people and wearing a mask on reducing exposure. We also conducted a literature survey on COVID-19, SARS-CoV-2, and infection control measures in the building environment, and disseminated information on how air conditioning and sanitary facilities should be designed in the event of an epidemic of novel coronavirus infections by presenting papers and publishing materials on the websites of the Architectural Institute of Japan and the Society of Heating, Air-conditioning and Sanitary Engineers of Japan.

Evidence reviews of air-conditioning system design guidelines for healthcare facilities

In healthcare facilities, it is necessary not only for medical personnel to implement infection prevention measures at the operational stage, but also to design them so that a hygienic environment can be maintained with consideration for infection prevention at the design stage. In Japan, there is a guideline for the design of hospital facilities by the Japan Health and Welfare Equipment Association, which is widely referred to as the de facto standard for design and operation, but the scientific basis for the recommendations is not always clear. However, the scientific basis for the recommendations is not always clear. In this study, we conducted a comparative survey of international guidelines for the design of medical facilities and a literature survey on the recommendations of the design guidelines for air conditioning equipment, and examined the level of evidence.

Evaluation of infection risk reduction methods in medical facilities

The exposure reduction effect of booths equipped with fan filter units, which are used in medical facilities to protect medical personnel from aerosol particles containing infectious viruses generated from the respiratory tracts of infected persons (including suspected infected persons) during medical examinations and tests were quantitatively evaluated using the cough simulator and particle counters. The behavior of aerosol particles was visualized by using a laser sheet and a high-speed camera, and possible improvements to the equipment were identified.

LIST OF RESEARCH ACTIVITIES

Architectural Planning / City Planning

Kenji TAKEMIYA

1. *Refereed Papers*

Miharu IRIE, Motohiro YASUI, Kenji TAKEMIYA

UTILIZATION ANALYSIS OF THE COMMUNITY CENTERS IN MUSASHINO CITY

–Comparative analysis of facility use surveys in 2008 and 2018–

International Journal of Japan Architectural Review for Engineering and Design, Vol.27, No. 65, pp.327-332, February 20, 2021

Sungryong KIM, Chisano SEKINE, Kenji TAKEMIYA

ACTUAL DEVELOPMENT AND USAGE OF COMMUNITY FACILITIES FOR HEALTHY ELDERLY(GYONRODANG) IN SEOUL

International Journal of Japan Architectural Review for Engineering and Design, Vol.26, No. 64, pp.1090-1095, October 20, 2020

Koji ODA, Kenji TAKEMIYA

POPULARIZATION OF PALLIATIVE CARE UNITS IN JAPAN

International Journal of Japan Architectural Review for Engineering and Design, Vol.26, No. 64, pp.1078-1083, October 20, 2020

Minjung BAE, Kenji TAKEMIYA

A STUDY ON ENTRANCE SITUATION AND FACILITY SUPPORT FOR DEALING WITH CHILDREN WITH MULTIPLE DISABILITIES WHO NEED SPECIAL MEDICAL CARE IN MEDICAL TYPE FACILITIES FOR CHILDREN WITH DISABILITIES

International Journal of Japan Architectural Review for Engineering and Design, Vol.26, No. 63, pp.643-648, June 20, 2020

Ayumi MINENO, Kenji TAKEMIYA

FIELD RESEARCH ON CARE SPACE OF DAY-SERVICE CENTER FOR CHILDREN WITH SEVERE MOTOR AND INTELLECTUAL DISABILITIES

International Journal of Japan Architectural Review for Engineering and Design, Vol.26, No. 63, pp.649-654, June 20, 2020

Minjung BAE, Kenji TAKEMIYA

USEFULNESS OF THE NEW LAYOUT AT CENTER K

A comparative analysis of the use of bedroom types for various severities of disability in children, *Journal of Architecture and Planning (Transactions of AIJ)*, Volume 85 Issue 770 , p p.829-836, April 30, 2020

2. Proceedings of Oral Presentations

KATSURAGAWA Rieko, OMORI Rio, TAKEMIYA Kenji

An introduction to public integrated compulsory education schools in Tokyo

-A Study on school management and planning for the curricular stages [4・3・2](part1)-

Summaries of technical papers of annual meeting E-1, *AIJ*, pp.405-046, 2020 (in Japanese)

OMORI Rio, TAKEMIYA Kenji

The utilization of “Teacher’s Corners” for the last 2 curricular stages OMORI Rio, TAKE MIYA Kenji -A Study on school management and planning for the curricular stages [4・3・2] (part 2)-

Summaries of technical papers of annual meeting E-1, *AIJ*, pp. 407-408, 2020 (in Japanese)

TAKAHASHI Sayaka, TAKEMIYA Kenji

Research on facility planning of Special Needs Education School specialized in employment support For advanced cases in Japan and Korea

Summaries of technical papers of annual meeting E-1, *AIJ*, pp. 427-428, 2020 (in Japanese)

NAKAGIRI Haruka, TAKEMIYA Kenji

Study on drafting and practical rooms suited for architectural design education Case study in university S and university C

Summaries of technical papers of annual meeting E-1, *AIJ*, pp. 449-450, 2020 (in Japanese)

KAWADA Asuka, TAKEMIYA Kenji

The changes as for the plan and the room composition of the community center -A case study of Mitaka City-

Summaries of technical papers of annual meeting E-1, *AIJ*, pp. 477-478, 2020 (in Japanese)

ITABASHI Asuka, TAKEMIYA Kenji

Utilization analysis of the community center in Tama City Comparative analysis with the 2004 survey

Summaries of technical papers of annual meeting E-1, AIJ, pp. 479-480, 2020 (in Japanese)

IRIE Miharū, TAKEMIYA Kenji

Utilization of the community center Y.

Study on utilization of the community centers in Musashino City.

Summaries of technical papers of annual meeting E-1, AIJ, pp. 481-482, 2020 (in Japanese)

ABE Hikaru, TAKEMIYA Kenji

Current conditions of Utilization of Spaces in Day Care Units for Psychiatric Patients at D and H Hospitals

- A Study on the Improvement of the Living Environment in Day Care Units for Psychiatric Patients Part 3 -

Summaries of technical papers of annual meeting E-1, AIJ, pp. 601-602, 2020 (in Japanese)

ODA Koji, TAKEMIYA Kenji

A feasibility study on palliative care units in designated cancer hospitals in Hokkaido

Summaries of technical papers of annual meeting E-1, AIJ, pp. 607-608, 2020 (in Japanese)

OKAMOTO Ryo, ISHIBASHI Tatsuo, TAKEMIYA Kenji, NAKAYAMA Shigeki and KOBAYASHI Kenichi

A Study on the Relationship between Room Structure and Main Function of Emergency Departments at Secondary Emergency Medical Hospitals in Hokkaido

Summaries of technical papers of annual meeting E-1, AIJ, pp. 619-620, 2020 (in Japanese)

KONDO Ryo, TAKEMIYA Kenji

Study on the locational planning of small unit-care facilities from

facility design and usage conditions : Case study in the Tokyo metropolitan area

Summaries of technical papers of annual meeting E-1, AIJ, pp. 671-672, 2020 (in Japanese)

HASEGAWA Miyabi, TAKEMIYA Kenji

Study on learning and sitting space for the children of "after school day services"

Summaries of technical papers of annual meeting E-1, AIJ, pp. 699-670, 2020 (in Japanese)

IRIE Miharū, TAKEMIYA Kenji

Utilization analysis of the community centers in Musashino City

Summaries of technical papers of annual meeting E-1, AIJ, pp.5-6, 2019 (in Japanese)

TAWARA Shihomi, TAKEMIYA Kenji

Study on the facility operation and utilization characteristics of the facilities for the elderly independent people -Targeting the Musashino City Tenmillion House Business-

Summaries of technical papers of annual meeting E-1, AIJ, pp.161-162, 2019 (in Japanese)

Bae Minjung, TAKEMIYA Kenji

Analysis on actual use of children by room type in which children are arranged at the medical-type facility K for children with disabilities

Summaries of technical papers of annual meeting E-1, AIJ, pp.211-212, 2019 (in Japanese)

ASAI Haruka , TAKEMIYA Kenji

Current condition and change of the facility planning of neonatal intensive care units

Summaries of technical papers of annual meeting E-1, AIJ, pp.253-254, 2019 (in Japanese)

ICHIKURA Kenta, SHIMADA Koki,WATANABE Reina, TAKEMIYA Kenji

A study on how to be used the conference room and the training room

- Characteristic of the staff area located between wards of cancer center O (Part1) -

Summaries of technical papers of annual meeting E-1, AIJ, pp.259-260, 2019 (in Japanese)

SHIMADA Koki, ICHIKURA Kenta, WATANABE Reina, TAKEMIYA Kenji

Utilization analysis of the open space and the staff stairs

- Characteristic of the staff area located between wards of cancer center O (Part2) -

Summaries of technical papers of annual meeting E-1, AIJ, pp.261-262, 2019 (in Japanese)

SEO Seokjun, TAKEMIYA Kenji

Research on the planning of day service facilities for The elderly with Independence -Analysis of the current state of facility management and planning of day service(type A) in Tokyo -

Summaries of technical papers of annual meeting E-1, AIJ, pp.143-144, 2019 (in Japanese)

TAKEMIYA Kenji, TSUSHIMA Takafumi

Research on facility planning of medical centers for dementia -Actual condition analysis of management and facility planning in designated medical institutions-

Summaries of technical papers of annual meeting E-1, AIJ, pp.235-236, 2019 (in Japanese)

ABE Hikaru, TAKEMIYA Kenji

Consideration about the Planning and the Way of Using Rooms of Day Care Units for Psychiatric Patients, - Study on the Improvement of the Living Environment in Day Care Units for Psychiatric Patients Part 2 -

Summaries of technical papers of annual meeting E-1, AIJ, pp.237-238, 2019 (in Japanese)

ODA Koji, TAKEMIYA Kenji

A research on the popularization of palliative care unit in Japan

Summaries of technical papers of annual meeting E-1, AIJ, pp.255-256, 2019 (in Japanese)

Tohru YOSHIKAWA

2. Proceedings of Oral Presentations

TAKENAKA Daiki, YOSHIKAWA Tohru and SANUKI Ryo, A Study of the Human Behavior of Selecting Places to Stay on the Grass in the Minamiikebukuro Park, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.1205-1206, (in Japanese), 2020.

YOSHIKAWA Tohru, On the equality of indexes to evaluate buildings for public facilities with distance decay of the utilization ratio, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.1181-1182, (in Japanese), 2020.

MIYAMOTO Yuki, YOSHIKAWA Tohru and SANUKI Ryo, The correlation between the construction of large-scale buildings by redevelopment projects and the changes of the surrounding commercial clusters in Japanese local cities -Focusing on the changes in the numbers of facilities in the commercial clusters-, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.1175-1176, (in Japanese), 2020.

SHIGENAWA Shota, YOSHIKAWA Tohru and SANUKI Ryo, Changes in the location and accessibility of medical facilities in existing urban residential areas -A case study in the suburbs of Tokyo Metropolis-, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.1163-1164, (in Japanese), 2020.

KANAYA Taichi, YOSHIKAWA Tohru and SANUKI Ryo, Study on the possibility of using rainwater facilities at the time of an earthquake disaster -A case study in Sumida City-, Summaries of Technical Papers of Annual Meeting, Architectural Institute of Japan, Urban Planning, pp.755-756, (in Japanese), 2020.

3. Others

3-2 Research Reports

NAKANISHI Takeru and YOSHIKAWA Tohru , Relationship between Cognitive Distance and Residential History in Metropolitan Areas -For the Tokyo Metropolitan Area-, Reports of the City Planning Institute of Japan, No.19, pp.101-107, (in Japanese), 2020.

ISHII Tomoya, YOSHIKAWA Tohru and SANUKI Ryo, Influence of the spatial distribution of tourism resources on the liveliness of the local city center, Reports of the City Planning Institute of Japan, No.19, pp.94-100, (in Japanese), 2020.

3-3 Manuals / Reviews

YOSHIKAWA Tohru, Cities of lines and canons, Studies on Tama New Town, NO.21, pp.98-101, (in Japanese), 2020.

Motoki TORIUMI

Masumi MATSUMOTO

Ryo SANUKI

1. Refereed Papers

1. Hidetsugu SAKODA, Tohru YOSHIKAWA, Ryo SANUKI : Research on the Location Tendency of "Children's Cafeterias" - Case study in several municipalities in Tokyo Metropolis, Proceedings of the Architectural Institute of Japan, Vol.85, No,778, pp.2661-2670, 2020.12

2. Proceedings of Oral Presentations

1. Taichi KANAYA, Tohru YOSHIKAWA, Ryo SANUKI : Study on the possibility of using rainwater facilities at the time of an earthquake disaster - A case study in Sumida City, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.755-756, 2020.9
2. Shota SHIGENAWA, Tohru YOSHIKAWA, Ryo SANUKI : Changes in the location and accessibility of medical facilities in existing urban residential areas - A case study in the suburbs of Tokyo Metropolis, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.1163-1164, 2020.9
3. Taichi KANAYA, Tohru YOSHIKAWA, Ryo SANUKI : The correlation between the construction of large-scale buildings by redevelopment projects and the changes of the

surrounding commercial clusters in Japanese local cities - Focusing on the changes in the numbers of facilities in the commercial clusters, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.1175-1176, 2020.9

4. Daiki TAKENAKA, Tohru YOSHIKAWA, Ryo SANUKI : A Study of the Human Behavior of Selecting Places to Stay on the Grass in the Minamiikebukuro Park, Summaries of technical papers of Annual Meeting, Architectural Institute of Japan, pp.1205-1206, 2020.9

3. *Others*

1. Tomoya ISHII, Tohru YOSHIKAWA, Ryo SANUKI : Influence of the spatial distribution of tourism resources on the liveliness of the local city center, Reports of City Planning Institute of Japan, No.19, pp.94-100, 2020.6
2. Yuki MIYAMOTO, Tohru YOSHIKAWA, Ryo SANUKI : The relationships between the construction of large-scale buildings by redevelopment projects and the changes in commercial accumulation around them of local cities in Japan - Focusing on changes in the number of facilities in commercial accumulation, Reports of City Planning Institute of Japan, No.19, pp.182-185, 2020.6
3. Ryo SANUKI : How to Use Public Assets in Conjunction with Policy - Efforts in Taipei City (Expansion of Urban Renewal through Utilization of Existing Buildings in Overseas Cities), Building Letter, No.664, pp.17-26, 2020.7
4. (Competition Entry) Applied for the open proposal for the basic design of the Kamo complex new government building in Aira City, Kagoshima Prefecture, and won the second prize.
5. (Competition Entry) Applied for the open proposal for the basic design of the Kajiki complex new government building in Aira City, Kagoshima Prefecture.

Architectural Design and History

Masao KOIZUMI

2. *Proceedings of Oral Presentations*

Masao KOIZUMI and others, A study on the reinforcement of opening in existing wooden architecture with consideration of permeability Part1. The horizonral loading test of fitting-type shear wall with polycarbonate plate, research report of Architectural Institute of Japan Kanto branch, pp.337-340, 2020.4 (in Japanese)

Masao KOIZUMI and others, A study on the reinforcement of opening in existing wooden architecture with consideration of permeability Part2. The horizonral loading test of screw-type shear

wall with polycarbonate plate, research report of Architectural Institute of Japan Kanto branch, pp.341-344, 2020.4(in Japanese)

3. *Others*

3-2 *Research Reports*

Masao KOIZUMI and others, Symposium 「architectural legacy for Creative City Yokohama」, Togo Murano Exhibition executive committee, 2020.12.20

Masao KOIZUMI and others, Symposium 「Subjects for carbon neutral learned from Design and Verification of LCCM demonstration house in Tsukuba」, Institute for Building Environment and Energy Conservation, 2020.12.20

3-3 *Manuals / Reviews*

Masao KOIZUMI and others, Togo Murano Exhibition 「M meets M」, Shin Kenchiku, Aug, p.15, Shinkenichiku-sya, 2020.12

Masao KOIZUMI and others, Togo Murano Exhibition 「M meets M」, SALON, No.98, p.5, Kanagawa Prefecture Society of Architects & Building Engineers, 2021.1

3-4 *Works / Products, etc.*

Masao KOIZUMI, Tatemonogatari 「Kotobukicho, Yokohama-shi health welfare interchange center」, Asahishinbun, Asahishinbun-sya, 2020.7.21

Masao KOIZUMI, Mt. Ontake Visitor Center, architectural design proposal, juror, 2020.7.21

Masao KOIZUMI, extension of elevator of Shinoharanishi elementary school, architectural design proposal, first prize, 2020.8

Masao KOIZUMI, 2021 Prize of Architectural Institute of Japan(technology), judge, 2020.9

Masao KOIZUMI, Totsugeki Tonarino Sugoiie 「ASHITANOIE」, BS TV-Tokyo, 2020.9

Masao KOIZUMI and others, SDGs in architecture 「Koganecho New Studio Site-D」, JIA MAGAZINE, p.17, 2019.10

Masao KOIZUMI and others, Togo Murano Exhibition 「M meets M」, BankART KAIKO,

2020.10.30~2020.12.27

Masao KOIZUMI and others, The 21th Awards of JIA Environmental and Architectual Design
「Konan Ward Office and Fire Station」, The Japan Institute of Architects, 2020.12

Masao KOIZUMI, Youkoudai apartment, architectural design proposal, second prize, 2020.11

Masao KOIZUMI, SurLuster Office, 2020.

Masao KOIZUMI, extension of elevator Shinoharanishi elementary school, 2021.

Yoshihiko ITO

3. *Others*

3-1 *Monographs / Technical books*

Yoshihiko ITO, Sumiko EBARA (Chiba University), Ikko OKAKITA (Kyoto Arts and Crafts University), Koichi KATO (The University of Tokyo), Taisuke KURODA (Kanto Gakuin University), Tomoaki NAKASHIMA (Kogakuin University), Yutaka MATSUMOTO (Osaka Sangyo University), and Yoshihiro YOKOTE (Tokyo Denki University), History of Western Architecture through Renovation (in Japanese), 2020.

3-3 *Manuals / Reviews*

Yoshihiko ITO, The Birth of the Mosque, Cultural Encyclopaedia of the Middle East and Orient, Tokyo: Maruzen Publishing, 20-21, (in Japanese), 2020.

Jun INOKUMA

Akira KINOSHITA

2. *Proceedings of Oral Presentations*

KINOSHITA Akira, *Analysis on the Composition of Seaton Delaval Hall and its Visual Effects*,
Summaries of Technical Papers of Annual Meeting, A.I.J., pp., 525-526, Sept. 2020 (in Japanese)

3. *Others*

3-3 Manuals / Reviews

KINOSHITA Akira, *Urban Renew and Spread by Renovating Existing Buildings in Overseas Cities, Pluralizing Conservation and Re-use Method utilizing Local History and Culture Cities of Taiwan, Taipei, Kaohsiung, New Taipei, Hualien, Yilan*, The Building Letter a Monthly Journal for Building Engineers, No. 654, June 2020, pp.33-48

Sho KADONO, Katsuhiko KOBAYASHI, Akira KINOSHITA, Tetsuya MITAMURA, *Urban Renew and Spread by Renovating Existing Buildings in Overseas Cities, Discussion Past / Present / Prospect of Architectural Conversion*, The Building Letter a Monthly Journal for Building Engineers, No. 662, February 2021, pp.13-33

Akira KINOSHITA, *Urban Renew and Spread by Renovating Existing Buildings in Overseas Cities, Architectural Conversion in Liberal City Toronto and City of Culture Montreal*, The Building Letter a Monthly Journal for Building Engineers, No. 666, May 2021(coming issue)

Construction Management and Building Materials

Yoshinori KITSUTAKA

1. Refereed Papers

- 1) Koichi IMASAWA, Masatoshi Horiguchi and Yoshinori KITSUTAKA: Study of Xonotlite — Based Autoclaved Lightweight Aerated Concrete with Cementitious Materials, J. Struct. Constr. Eng., AIJ, No.778, 1525-1531, 2020.12 (in Japanese)
- 2) Koichi MATSUZAWA, Tadatsugu KAGE and Yoshinori KITSUTAKA : Environmental Temperature on Pull-Out Properties of Post-Installed Mechanical Anchor, AIJ Journal of Technology and Design, Vol. 27, No. 65, pp.104-107, 2021.2 (in Japanese)

2. Proceedings of Oral Presentations

- 1) Yoshinori KITSUTAKA: A Simple Expression Of Concrete Strength Reduction Caused By Expansive Deterioration Of Inclusion, Summaries of Technical Papers of Annual Meeting, AIJ, Construction Materials, pp.193-194, 2020.9 (in Japanese)
- 2) Keigo YOSHIDA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA, Satoshi SASAKI: Study on Prevention of Peeling of Floating Tiles by Joints, Summaries of Technical Papers of Annual Meeting, AIJ, Construction Materials, pp.521-522, 2020.9 (in Japanese)
- 3) Koichi IMASAWA, Masatoshi Horiguchi, Yoichiro KUNIEDA, Yoshinori

- KITSUTAKA: Study of Mechanical Performance of Xonotlite-Based ALC at High Temperature Part1 Compressive Strength, AIJ, Construction Materials, pp.565-566, 2020.9 (in Japanese)
- 4) Daichi SATO, Koichi IMASAWA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: Study of Mechanical Performance of Xonotlite-based ALC at High Temperature Part2 Crack resistance, AIJ, Construction Materials, pp.567-568, 2020.9 (in Japanese)
 - 5) Yukinori KAI, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: Proposal of a Method for Minimizing the Cost of Disaster Waste Disposal Due to the Nankai Trough Earthquake, AIJ, Construction Materials, pp.675-676, 2020.9 (in Japanese)
 - 6) Koya SASAKI, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: Basic Study on Cyclic Fatigue Method of Post-Installed Anchor Bolt for Concrete, AIJ, Construction Materials, pp.991-992, 2020.9 (in Japanese)
 - 7) Yoichiro KUNIEDA, Yoshinori KITSUTAKA: Proposal of Noise Evaluation Method for Reducing Environment Impact of Building Demolition, AIJ, Construction Materials, pp.1103-1104, 2020.9 (in Japanese)
 - 8) Hikaru HIROKAWA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: Estimation of the Impact on the Environment to Transport Recycled Aggregate, AIJ, Construction Materials, pp.1129-1130, 2020.9 (in Japanese)
 - 9) Miki HASEGAWA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA, Susaki HONOKA: Fundamental Study on Improvement of Geopolymer Concrete, Part 1. Fluidity Improvement by Adding MgO, AIJ, Construction Materials, pp.1141-1142, 2020.9 (in Japanese)
 - 10) Susaki HONOKA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA, Miki HASEGAWA: Fundamental Study on Improvement of Geopolymer Concrete, Part2.Fluidity and Strength Improvement by Adding Recycled Gypsum, AIJ, Construction Materials, pp.1143-1144, 2020.9 (in Japanese)
 - 11) Natsuki NAKANO, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: The Effects of Deformational Performance Caused by Thermal Fluctuation on Delamination of Exterior Tiles, AIJ, Construction Materials, pp.1195-1196, 2020.9 (in Japanese)
 - 12) Haruka OGAWA, Yoshinori KITSUTAKA, Yoichiro KUNIEDA: Study on Damage of the Gymnasium Flooring Caused by the Wheelchair Sports. Part 7, AIJ, Construction Materials, pp.1279-1280, 2020.9 (in Japanese)

Makoto TSUNODA

2. *Proceedings of Oral Presentations*

OGAWA Yukiko, TSUNODA Makoto, Experimental study on the problem of installing inner window by DIY in rental house and its improvement method., Summaries of Technical Papers of

Annual Meeting, AIJ, Architectural Planning and Design, pp.1227-1228, Sep. 2020 (in Japanese)

FUKUDA Kyouhei, TSUNODA Makoto, A study on the facade design with change of ground plan for renovation, Summaries of Technical Papers of Annual Meeting, AIJ, Architectural Planning and Design, pp.1229-1230, Sep. 2020 (in Japanese)

HIRADATE Ayano, TSUNODA Makoto, Study on the weathering for the edge of eaves of wooden roof frames, Summaries of Technical Papers of Annual Meeting, AIJ, Architectural Planning and Design, pp.1273-1274, Sep. 2020 (in Japanese)

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Kazuhiro KITAYAMA

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Toshikazu KABEYASAWA

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Noriko TAKIYAMA

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Kazushige YAMAMURA

Environmental Engineering

Akihiro NAGATA

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Masayuki ICHINOSE

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Masayuki OGATA

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3. *Others*

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- 2) Masayuki Ogata. Environmental factors that promote COVID-19 outbreaks. Journal of Japan Air Cleaning Association. 58(3). 134-138. 2020.09 (in Japanese)