JPCI NEWSLETTER

No.15, February 2024

Japan Prestressed Concrete Institute

JPCI AWARD

Award for Outstanding Structures
- Civil Engineering Structures Category -

● **Yoshinogawa Sunrise Bridge**

Location : Tokushima City, Tokushima Prefecture
Outline of Structure :
YOSHINOGAWA SUNRISE BRIDGE, a continuous prestressed concrete (PC) box girder bridge with a total length of 1696.5m, is one of Japan's longest road bridges. It was designed and constructed carefully at the estuary of the Yoshino River, a home to a wide variety of species, so as not to disturb the natural balance in the ecosystem. The number of piers in the river was minimized to reduce environmental impact, and the length of the span in the river was stretched to 130 m. The cantilever length is one of the longest in the world for a PC box girder using precast segments.

Client : West Nippon Expressway Co., Ltd
Basic Design : Eight-Japan Engineering Consultants Inc.
Detailed Design : Joint Venture of KAJIMA Co., Ltd., Sumitomo Mitsui Construction Co., Ltd. And TOYO Construction Co., Ltd.
Construction : Joint Venture of KAJIMA Co., Ltd., Sumitomo Mitsui Construction Co., Ltd. And TOYO Construction Co., Ltd.

● **Iwagi Bridge**

(References: Bridge and Foundation Engineering, September 2019, Bridges and Foundation Engineering, February 2022)
Location : Iwagi Island ~ Ikina Island,
Kamijima Town, Ochi-gun, Ehime Prefecture
Outline of Structure :
The Iwagi Bridge connecting Iwagi Island and Ikina Island consists of PC composite approach bridge on both sides and the main bridge section of a 735-m-long, 5-span continuous mixed steel-concrete cable-stayed bridge, reaching a total length of 916m. The main bridge section is a mixed structure composed of concrete structure in the side spans and part of the center span; and a 315m steel structure in the middle of the 475m center span.
The main tower is a hollow-section RC structure with a height of over 130m connected by two horizontal members, and diagonal cables are suspended in a 15-level double arrangement mounted between the spans of each side of each main tower. It is one of the largest cable-stayed bridges in Japan, with the longest cable reaching 231 meters.

Client : Ehime Prefecture
Design : Chodai Co., Ltd.
Construction :
Kajima Corporation -MM Bridge Co., Ltd. -Fuji P.S Corporation Joint Venture,
Sumitomo Mitsui Construction Co., Ltd.-Sumitomo Mitsui Construction Steel Structures Engineering Co., Ltd.- Showa Concrete Industry Co., Ltd. Joint Venture,
Sumitomo Mitsui Construction Co., Ltd., Aikyo Co., Ltd.
Shikokutsuken Co.,Ltd., Idumo Corporation, Ogawa Construction Co., Ltd., Daiou Corporation,
Aien Industry Corporation, Oike Corporation

Client : Japan Railway Construction, Transport and Technology Agency, Kyushu Shinkansen Construction Bureau.
Design : Yachiyo Engineering Co., Ltd.
Construction : TEKKEN Corporation, Kyutetsu Corporation and HORIUCHI Construction Co., Ltd. JV

● Nishi Kyushu SHINKANSEN the 2nd Honmyou River Bridge

(Journal of the 28th Symposium on Developments in Prestressed Concrete, Journal of the 18th Railway Engineering Symposium, Bridge and Foundation Engineering, 2022.11.)

Location : Isahaya City, Nagasaki Prefecture
Outline of Structure :

This bridge is located between Shin-Omura Station and Isahaya Station on the Kyushu Shinkansen (between Takeo Onsen and Nagasaki), which opened in September 2022, and is a 3-span continuous PC box girder crossing over the first-class river Honmyou River in Isahaya City. Since this bridge crosses the river at a shallow angle, the central span is 115m which is the longest among similar bridges for the Shinkansen. Because the side span intersects the road with a low clearance due to topographical conditions, the height of the PC girder is limited, so it was necessary to address the girder deflection and to maintain riding comfort. Therefore, a verification method that approximates the actual live load conditions was developed, and its validity was verified by actual train running tests.

Award for Outstanding Structures
- Buildings Category -

Client : Kawaguchi City
Design : Kume Sekkei Co., Ltd.
Construction : Phase 1：Kawaguchi Construction Co., Ltd.
Phase 2：Kawaguchi Construction and Shinmei Construction Joint Venture
Construction (PC) : Phase 1 and 2：P.S. Mitsubishi Construction Co., Ltd.

● Kawaguchi City High School

(Journal of Prestressed Concrete Japan Vol.65 No.1)

Location : Kawaguchi City, Saitama Prefecture
Outline of Structure :

Kawaguchi city high school is a reorganization and integration of three high schools in Kawaguchi city, Saitama prefecture. The campus consists of a school building and two arena buildings centered on campus road. Based on site-specific conditions such as building height restrictions and other spatial configuration requirements, various prestressed concrete (PC) components such as precast prestressed concrete (PCaPC) columns, PCaPC slabs, and cast-in-place PC beams are used to achieve the high-quality educational environment required for each of the regular classrooms, special classrooms, and the arena. In addition, pretensioned spun high strength concrete (PHC) piles are used as geothermal piles. Geothermal heat is utilized for HVAC (heating, ventilation, and air conditioning) system in the teachers' room, which is also environmentally friendly.

Client : Shimizu Corporation
Design : Shimizu Corporation
Construction : Shimizu Corporation

● TOYOSU MiCHi NO EKI

(Journal of Prestressed Concrete Japan Vol.64 No.4, Japan Architect 2022.1, Structure No.163 2022.7)

Location : Koto City, Tokyo Prefecture
Outline of Structure :

This structure is a pedestrian deck that is directly connected to the station and a space that aims to create bustle in the city and interaction among people. The traffic plaza, which is located on ground floor below the deck, requires visibility and openness as a public space. The structure was realized by adopting 3-ways diagonally crossed prestressed concrete frames.
The post-tensioning cables and reinforcement bars intersecting from 3-directions were converted into digital data using a 3D modeling tool. Bar arrangement studies, which are difficult to develop with 2D drawings, were carried out by linking any structural elements with BIM from design phase to construction phase. As a result, we have realized an attractive new frame system that takes advantage of the characteristics of the prestressed concrete structure.

Award for Outstanding Structures
- Renovations Category -

● Deck slab renewal work of Tadeno No.2 Bridge (outbound line)

Location : Kanoashi-Gun, Shimane Prefecture
Outline of Structure :
In the deck slab renewal work of Tadeno No.2 Bridge, the ultra-high durable deck slab which completely eliminates the embedded elements in concrete slabs that cause corrosion deterioration, such as reinforcing bars or prestressing steel was used for the first time. The main materials were high-strength fiber reinforced concrete and aramid FRP rods as PC-tendon in two directions. The ultra-high durable deck slabs were connected by aramid FRP rods. Eliminating potentially corrosive steel members significantly improves the durability of concrete structures, reduces life-cycle cost, and prevents third party injuries due to concrete peeling. In the aspect of sustainability, it is also possible to reduce life-cycle CO2 emissions from the construction of structures to the operation and renewal of roads.

Client : West Nippon Expressway Co., Ltd.
Design : Sumitomo Mitsui Construction Co., Ltd.
Construction : Joint Venture of Sumitomo Mitsui Construction Co., Ltd and Nippon P.S Co., Ltd.

● Widening work of Tsumetadani bridge (outbound line)

(Bridge and Foundation Engineering (Vol.56, 2022.6,) The 31st Symposium on Developments in Prestressed Concrete, (2022.10))
Location : Koka City, Shiga Prefecture
Outline of Structure :
In the widening work of this bridge, the first attempt was made to replace the entire amount of natural sand with blast furnace slag fine aggregate (BFS) for PC girders to be added. By using BFS to reduce the creep and drying shrinkage of new PC girders, the half-year waiting period required for joining to the existing bridge was eliminated, and the process was shortened. In addition, the productivity of on-site work has been improved by using precast segment for the new girder. Furthermore, a rational structure was realized by adopting new technology for the PC steel material.

Client : West Nippon Expressway Company Limited
Design : P.S. Mitsubishi Construction Co., Ltd.
Construction : P.S. Mitsubishi Construction Co., Ltd.

Award for Outstanding Accomplishments of Constructions

Client : Ministry of Land, Infrastructure, Transport and Tourism Kyushu Regional Development Bureau, Saga National Highway Office
Design : Chuo Consultants Co., Ltd.
Construction : Fuji P.S. Co., Ltd.

● National Route 3 Chitose Bridge Repair Work

Location : Tosu City, Saga Prefecture
Outline of Structure :

The Chitose Bridge across National Route 3 is an RC 7-span Gerber T-girder bridge. In 1996, it was reinforced by the "continuous cable girder suspension method" using outer cables, which was the first method in Japan to reinforce the Gerber hinges.

Damage on the external cable was found in regular inspections, and prompt repair measures were required due to concerns about insufficient load bearing capacity.

Since there are no examples of the continuous cable girder suspension method, repair work was ordered by the ECI method, technical proposal/negotiation method, replacement of the external cable, system-type suspended scaffolding, etc. were proposed and adopted.

These proposals minimized the impact on current road traffic and significantly shortened the process.

EVENTS

Annual Symposium
- The coming symposium -

The 33rd Symposium on Developments in Prestressed Concrete

17th - 18th October 2024

https://www.jpci.or.jp/eng-index.htm

The 33rd Symposium on Developments in Prestressed Concrete will take place on October 17 and 18, 2024 in Niigata. The venue is Toki Messe, Niigata Convention Center. The objective of the symposium is to further develop prestressed concrete technology by sharing valuable knowledge obtained from research and practices. In the symposium, special lectures will be given as usual. There will be two speakers, one from Japan and the other from overseas.

- The last symposium -

The last symposium, “the 32nd Symposium on Developments in Prestressed Concrete”, was held on 26th and 27th October 2023 at the Big Palette Fukushima (Fukushima Trade Fair Center) in Koriyama. The purpose of the symposium is to attain further development of prestressed concrete technology by sharing valuable information among researchers.

Previous to the symposium, the Workshop was held. Dr.-Ing. Shin Narui, Association for Sustainable Infrastructure in Fukushima, Ltd, chairman of the committee, gave a keynote speech titled “Learning about Bridge Maintenance from Germany". Then, a special discussion was held on the topic of the past and future of prestressed concrete. The speakers were Dr.-Ing. Shin Narui and Dr. Akio Kasuga, Executive Officer Vice President of Sumitomo Mitsui Construction Co., Ltd., former president of *fib*, and Dr. Iwaki, Professor of the Nihon University, acted as the facilitator.

Venue, Big Palette Fukushima

Opening ceremony

Prof. Yasuhiko Sato

Dr. Akio Kasuga

Then Dr. Mitsuyasu Iwanami, professor of Tokyo Institute of Technology, chairman of the Subcommittee on the Contribution of Structures using PC Technology to a Low-carbon Society, explained the committee's basic policy.

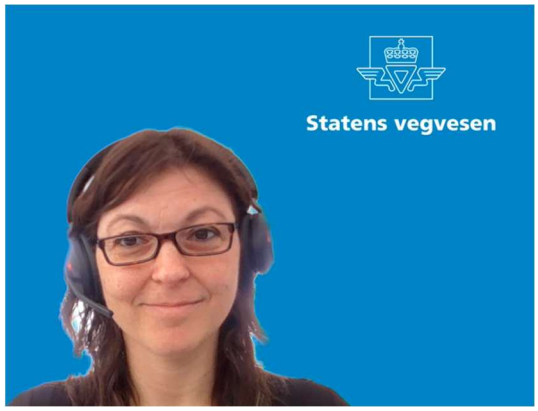
In the Opening Ceremony Dr. Yasuhiko Sato, professor of the Waseda University, the chairman of the Executive Committee of the Symposium, gave an opening address. History and outline of the symposium were introduced. Dr. Takumi Shimomura, professor of the Nagaoka University of Technology, president of the JPCI gave an opening speech. Then, Mr. Yasuhiro Kimura, manager of the Road Department of the Tohoku Regional Bureau, Ministry of Land, Infrastructure, Transport and Tourism gave a speech of greeting.

Dr. Akio Kasuga was awarded the Special Achievement Award in recognition of his contributions to the development of PC technology in Japan and his successes overseas, including serving as former president of *fib*.

Dr. Yasuaki Chino, Associate Professor of the Nihon University and Dr. Arianna Minoretti, the Department of Technology and Development for the Norwegian Public Administration, were invited and gave special lectures.

Dr. Yasuaki Chino presented “The People and Technology that Create Asaka Canal”. The Asaka Canal was a state-run project planned as part of the encouragement of new industry and the samurai welfare policies at the beginning of the Meiji period. In order to open up the Asaka Plains (present-day Koriyama urban area, Fukushima Prefecture), which had lacked water until early modern times, water was sought from Lake Inawashiro, and a canal plan was implemented to transport water through the Ou Mountains. Construction began in 1879 and was completed in 1882. At the time of completion, the main waterway was 52km long, the branch waterway was 78km long, there were 37 tunnels, and the beneficiary area was about 3,000 ha. Van Doorn, a hired Dutch engineer who participated as a design consultant, made a great contribution to the completion of the project, but Japanese people were involved in the field investigation, surveying, preparation of materials for route selection, and construction (850 thousand people in total). Asaka Canal became the driving force behind the development of Koriyama City, and still plays an important role in water demand today. In 2002, it was recognized as a Civil Engineering Heritage Site by the Japan Society of Civil Engineers, and in 2016 as a World Irrigation Facility Heritage Site and a Japan Heritage Site.

Dr. Yasuaki Chino



Dr. Arianna Minoretti

Dr. Arianna Minoretti presented online “Sustainability in the Norwegian Public Road Admini stration”. In recent years, the topic of sustainability has attracted the attention of private and public institutions, and the Norwegian Public Roads Authority (NPRA) is no exception. NPRA manages approximately 10,500 km of national roads on behalf of the Norwegian Central Government and is one of Norway's largest construction and maintenance operators. NPRA also handles research and development, IT, road safety, planning, design and verification, and has specific departments that address national rules and regulations. The objectives of the national transport plan are higher cost performance, efficient use of new technologies, contribution to linking Norway's climate and environmental goals, Vision Zero (no fatalities or serious injuries) and easy daily life. It has improved the competitiveness of mobility, business and industry. The Norwegian Road Administration's sustainability strategy covers five areas and sets targets: 1) Greenhouse gas emissions and climate change adaptation, 2) Resource usage and circular economy, 3) Biodiversity and ecosystems, 4) Ripple effects for local communities and road users, and 5) Legal compliance and working conditions in the supply chain and transport industry. In terms of materials, NPRA is researching and developing concrete that is highly durable and emits low CO_2 emissions. Norway is also working on a project to capture and store CO_2. In addition, NPRA is also working on design and optimization, and on changing ways of thinking.

Technical exhibition

Parallel session

Award of excellent presentation

In order to exchange information concerning activities, researches and original technologies 37 groups participated in the technical exhibition. Firms and organizations displayed their current information in the booths provided for the Technical Exhibition. Presentations were made by exhibitors and active discussions for each presentation were made in the exhibition hall.

In the last symposium, the total participants were 648. In the parallel sessions, 38 contributed papers and 109 reports were presented in 18 sessions. From each session, the most excellent presenters were chosen and were given “Award of Excellent Presentation”. Prize winners are as follows.

Session 1: *Mako Kusabe*, Sumitomo Mitsui Construction Co., Ltd.
Session 2: *Yohei Terashima*, Obayashi Corporation
Session 3: *Naoki Hagiwara*, Central Nippon Expressway Co., Ltd.
Session 4: *Yudai Hirayama*, Kajima Corporation
Session 5: *Masahiro Abe*, Kajima Corporation
Session 6: *Masaru Fujishiro*, Kajima Corporation
Session 7: *Kento Komai*, Kyoto University
Session 8: *Hikaru Nagatomo*, Japan Railway Construction, Transport and Technology
Session 9: *Yoshino Sako*, Nippon P.S Co.,Ltd.
Session 10: *Ai Kishimoto*, Fuji P.S Corporation
Session 11: *Takayuki Ostuka*, Sumitomo Mitsui Construction Co., Ltd.
Session 12: *Mayo Fujimoto*, Graduate School, Kinjo Gakuin University
Session 13: *Aoi Furusawa*, Graduate School, Kyoto University
Session 14: *Shintaro Minoura*, Railway Technical Research Institute,
Session 15: *Shiyogo Akimichi*, Sumitomo Mitsui Construction Co., Ltd.
Session 16: *Takanori Shimano*, IHI Construction Service Co., Ltd
Session 17: *Yasuji Tanaka*, Kanazawa Institute of Technology
Session 16: *Kyoko Takeda*, Oriental Shiraishi Corporation

Closing Ceremony

■ This newsletter contents current information on the activities and topics of JPCI.

■ If you have any comments and suggestions, please contact us by sending e-mail to: kaiinka-r5@jpci.or.jp

Internationalization Subcommittee
International Committee
Japan Prestressed Concrete Institute
Dai-san-Miyako Building, 4-6, Tsukudo-cho
Shinjyuku-ku, Tokyo
162-0821, JAPAN
https://www.jpci.or.jp/