JPCI NEWSLETTER

No.12, October 2019

Japan Prestressed Concrete Institute

JPCI AWARD

Award for Outstanding Structures

Client : West Nippon Expressway Company Limited. Kansai Branch
Design : Taisei Corporation
Construction : Taisei Corporation – P.S. Mitsubishi Construction Co., Ltd. JV

●IKUNO BRIDGE

Location : Kobe-City, Hyogo
Outline of Structure :

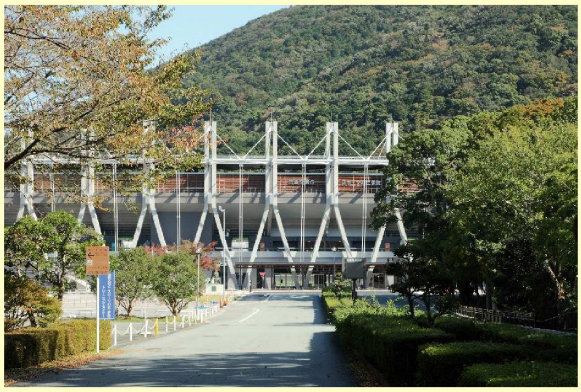
Ikuno Bridge is a 7-span continuous prestressed-concrete bridge including extradosed bridge with corrugated steel webs, located on Shin-Meishin Expressway. The total length of the bridge is 606m. Since this bridge needs to span over the JR line diagonally, the center span length requires 188m.
To reduce the construction duration, several new technologies were adopted. For example, pier-head at pier six was constructed on the temporary stage simultaneously during the pier construction and finally it was placed on the pier sliding on the temporary steel rails. Further, extra-large travelers are adopted to construct longer segment of extradosed bridge. Because of enhancing maintenance and management performance, a new stay-cable system and High-durability members are applied.

Client : Ministry of Land, Infrastructure, Transport and Tourism Onahama Port Office
Design : Oriental Consultants, and others
Construction :Shimizu Corporation, Toa Corporation, Kawada Construction (Joint Venture), and others

●ONAHAMA Marine Bridge

Location : Iwaki-City, Fukushima
Outline of Structure:

The Onahama Marine Bridge is a harbor bridge connecting the Higashi-Ko area, which is an artificial island of Onahama Port, and the No.3 wharf area. It is composed of a total of three bridges: A five-span continuous PC extradosed bridge (510 m) at the main bridge section, and two four-span continuous PC two box girder bridges (220 m + 197 m) at the approach sections. The extradosed main bridge is the first in Japan for a harbor bridge. In addition, future maintenance burden has been reduced by the consideration of long-term durability (salt damage control), and the delivery of plans and manuals for maintenance and inspection. This bridge, a new landmark for Onahama District, has been regarded by the local communities as an attachable symbol of reconstruction from 2011 Tohoku earthquake and tsunami.



Client : Mie Prefecture
Design : Yasui Architects & Engineers, Inc.
Construction (PC) : P.S. Mitsubishi Construction Co., Ltd.

●Mie Kotsu Group Sports no Mori Ise Athletics Stadium●

Location : Ise City, Mie Prefecture
Outline of Structure:
This facility, a sports stadium within Ise Jingu shrine precincts,is themed on "Unity with Ise." The structural frame design draws on the image of traditional timber framing techniques. The flat roof, using tension rods to keep the height down,harmonizes with the mountain range behind it, and expresses the sense of tension that is part of sports. The range of
materials is limited to concrete, steel, and locally-grown timber, which are also used for their textures.

●Heijokyu Izanai-kan●

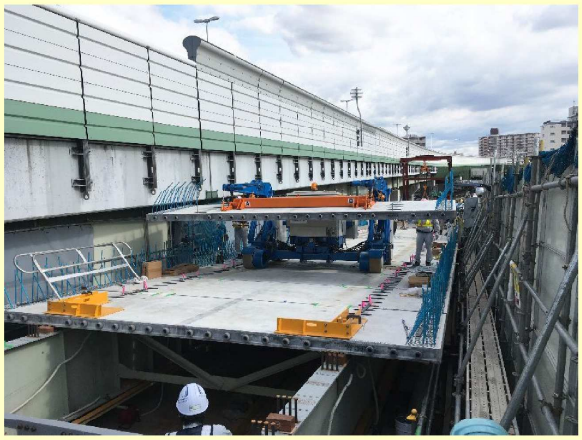
Location : Nara-City, Nara
Outline of Structure :
Heijokyu Izanai-kan is an interpretive center which explains the significance and splendor of the Heijokyu-seki Rekishi Koen (Nara Palace Site Historical Park), and invites you to the palace site, which evokes the spirit of ancient times.
Structural Type: RC(Girder:PRC), Number of Stories:2 stories, Building use: exhibition pavilion, Total floor space: 6755.59 ㎡
Client : Ministry of Land, Infrastructure, Infrastructure, Infrastructure, Transport and Tourism
Kinki Regional Development Bureau
Asuka Historical National Government Park Office
Design :MHSPlanners, Architects & Engineers, Oriental Consultants Co., Ltd
Construction : OKUMURA CORPORATION
Construction(PC) : Oriental Shiraishi Corporation

Client : Ministry of Land, Infrastructure,Transport and Tourism Kyushu Regional Development Bureau Kumamoto Reconstruction Office
Design : CTI Enginnering Co,.Ltd
Construction : Fuji P.S corporation,Sugimoto Construction, Fujimoto Construction JV,Higo Construction, Nanyou Construction JV

●Repair of bridge on Choyo-ohashi route●

Location :Minamiaso-Village,Aso-gun,Kumamoto
Outline of Structure:
The Aso Choyo-ohashi Bridge and Toshita-ohashi Bridge on Choyo-ohashi Route were severely damaged by Kumamoto earthquake and were closed. The Aso Choyo-ohashi which was 4-span continuous rigid frame PC box girder bridge caused enormous damages by the earthquake such as the collapse of abutments, etc. The Toshita-ohashi bridge which was 17-span pre-tensioning simple girder bridge suffered massive damages such as the damage and collapse of superstructure, collapsing and the inclination of the bridge pier, etc. due to the landslide caused by earthquake.
The Choyo-ohashi Route was opened in short term period as a results of Carbon-fiber sheet reinforcement in the girder and the bridge piers, reconstruction of abutments and concrete filling of hollow piers in Aso Choyo-ohashi bridge and removed and replaced the damage girder with the new one and added the pile in Toshita-ohashi bridge

Award for Outstanding Accomplishments of Constructions



●Flat UHPFRC Deck Slab for Highway Bridge●

Location : Osaka City, Osaka

Summary :

Flat Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) deck slabs, which show remarkable fatigue durability, have been developed to replace highway bridge slabs that have deteriorated. These newly developed slabs were applied to Tamade rampway bridges for the first time in Japan. Anchor plates for longitudinal post-tensioning tendons were downsized, and all reinforcement bars in the anchorage zone were eliminated by fully utilizing the excellent material properties of UHPFRC. As a result, the durability of these slabs has been further improved by applying longitudinal pre-stress along the slab from end to end. Since these UHPFRC slabs are lighter than the original slabs, the steel girders require minimal strengthening. These precast panels were erected within the breadth of the rampway using a unique lightweight machine.

This combination of technologies assuredly contributes to the renewal of deck slabs along aging urban highway bridges in congested areas.

Development : Hanshin Expressway Company Limited, Kajima Corporation

●GRS Integral Bridge with PC Girder●

Location : Isahaya-City, Nagasaki

Summary :

"GRS Integral Bridge with PC Girder" is developed in order to apply GRS integral bridge to longer span than ever before. "GRS Integral Bridge" combines "Integral Bridge" and "GRS (Geosynthetic-Reinforced Soil) Abutments", developed as a solution to long-standing issues; settlement of embankments and maintenance of bridge supports. In the past, only RC girder or SRC girder is applied to GRS integral bridge. To extend span of GRS integral bridge by using PC girder as superstructure, method of rigid connection between PC girder and GRS abutments, and connection between abutment wall and embankment are developed by confirming validity of reduction of statically indeterminate force and stability against seismic force.

Development : Japan Railway Construction, Transport and Technology Agency, Railway Technical Research Institute

Award for Outstanding Engineering Innovations

●Suzuka Viaduct of Shin-Meishin Expressway●

Location : Suzuka, Mie
Outline of Structure :
The Suzuka viaduct is PC (15+12+12) span continuous box-girder bridge with a standard total width of 10.8 m and a span of 43.0 to 46.0 m and a total length of approximately 1.8 km. As it was possible to secure large-scale main girder segment production yard and stock yards at the Suzuka PA construction site on the adjacent Shin-Meishin Expressway. A comprehensive consideration of the economy, construction period shortening, and reduction of influence on surrounding environment, we adopted precast segment construction method by line match cast method. In the segment production, in order to reduce the impact on the surrounding environment, a large-scale ceiling facility was used so that all production processes can be performed within one ceiling facility.
Client : Central Nippon Expressway Co., Ltd.
Design : P.S. Mitsubishi Construction - Fuji P.S JV
Construction : P.S. Mitsubishi Construction - Fuji P.S JV

●Algawa Bridge●

Location : Osaka
Structural Type : (Eastbound) 8-span continuous PRC rigid box girder bridge (corrugated steel web + PRC box girder) (Westbound) 5-span continuous PRC rigid box girder with corrugated steel web bridge
Bridge Length : (Eastbound) 636.0m (Westbound) 545.5m
Span : (Eastbound) 50.4+120.0+179.0+99.5+3@50.0+33.9m (Westbound) 65.4+142.0+170.0+120.5+44.4m
Effective width : 9.760m(temporary)16.010m(permanent)
Design : Sumitomo Mitsui Construction Co., Ltd.
Construction : Sumitomo Mitsui Construction Co., Ltd.

●Natsui Viaduct on National Road No.45●

Location : Kuji-City, Iwate
Outline of Structure :
Natsui Viaduct is a seven-span continuous box-girder bridge made with prestressed reinforced concrete on the Sanriku Coastal Road as part of reconstruction road for the Great East Japan Earthquake. The action to "i-Bridge" which Ministry of Land, Infrastructure and Transport and Tourism promoted was carried out in a process for a cycle of the balanced cantilever method. It was constructed high quality by safe construction while aiming at the improvement of the productivity by various information and communication technology (ICT). For example, “Effective utilization of the bridge 3D model”, “The surveying by a mobile terminal and the total station” and “Making system of inspection record documents automatically by the survey results”
Client : Ministry of Land, Infrastructure, Transport and Tourism -The Touhoku Regional DevelopmentBureau–Sanriku National Highway Office
Design : Fukken Gijyutsu Consultants Co.,Ltd.
Construction : Sumitomo Mitsui Construction Co., Ltd.- Abe Nikko Kogyo Co.,Ltd. - Nippon P.S. Co.,Ltd. JV

EVENTS

Annual Symposium
- The coming symposium -

The 28th Symposium on Developments in Prestressed Concrete

7th - 8th November 2019

Nagoya, Japan
http://www.jpci.or.jp/eng-index.htm

Topic of the next symposium is special lectures. After the opening ceremony, Mr. Haruto Maeda, Chairman of the PC Archives committee, Prof. Takumi Shimomura, Chairman of National Report Editorial Committee and Prof. Alessandro Palermo, University of Canterbury, New Zealand, will give special lectures.

- The last symposium -

The last symposium, "the 27th Symposium on Developments in Prestressed Concrete", was held on 8th and 9th November 2018 at Ehime Prefectural Cultural Hall (Himegin Hall) in Matsuyama. 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. Technical Standard Committee provided information regarding the collapse of the viaduct in Genoa, Italy, and opinions were exchanged with participants. Mr. Naohiko Kawamura, vice chairman of the committee, reported activities of the PC Composite Tsunami Disaster Prevention Structure Committee. Prof. Pang-jo

Venue, Ehime Prefectural Cultural Hall

Opening ceremony

Mr. Keiji Matsumoto

Prof. Hiroshi Mutsuyoshi

Chun presented "Present state of artificial intelligence (AI) technology and its application to non-destructive inspection

In the Opening Ceremony Dr. Ichizo Kishimoto, professor of the Kindai University, the chairman of the Executive Committee of the symposium, gave an opening address. History and outline of the symposium were introduced. Dr. Kimihiko Uji, professor of the Tokyo Metropolitan University, president of the JPCI gave an opening speech. Then, Mr. Masashi Tanimura, Director of the Road Department of Shikoku Regional Bureau, Ministry of Land, Infrastructure, Transport and Tourism gave a speech of greeting.

Mr. Keiji Matsumoto, Director of the Saka no Ue No Kumo Museum, and Dr. Hiroshi Mutsuyoshi, professor of the Saitama University, were invited and gave special lectures.

Mr. Keiji Matsumoto presented "Matsuyama, the town of "Saka no Ue no Kumo" - Matsuyama in the Meiji era and the heroes of Saka no Ue no Kumo -". Matsuyama is famous for Dogo Onsen. In the Edo period, the Matsudaira family, the relative of the Tokugawa family, became the lord. In 1828, Sadamichi Matsudaira opened the Meikyokan (later Matsuyama Junior High School) as an educational institution. Meikyokan is a school like a gateway to Tokyo, and has produced many celebrities such as Shiki Masaoka, Saneyuki Akiyama and Yoshifuru Akiyama the main character of this lecture. Shiki Masaoka is a haiku poet, waka poet and journalist. Like many Matsuyama youth, Shiki longed for Tokyo, entered the University of Tokyo to become a politician, and met Soseki Natsume and many great people. He worked energetically despite the disease of tuberculosis, and wrote over 20,000 haikus throughout his life. Saneyuki Akiyama was an old friend with Shiki. He also entered the University of Tokyo and began to study literature. Akiyama, however, chose to go to the Navy and dropped out of university to study in the United States in 1897. He made a major contribution to the overwhelming victory of the Battle of Japan Sea during the Russo-Japanese War as a staff of the combined fleet led by Heihachiro Togo. Yoshifuru Akiyama was entered the Military Academy and fought an equal battle with the world during the Russo-Japanese War. On the other hand, he is well known as an educator who loved Yukichi Fukuzawa. He studied in France in 1887 and touched on the latest science and technology in the West.

Dr. Hiroshi Mutsuyoshi presented "Advanced in Post-Tensioning in North America" on behalf of Mr. Theodore Neff, former PTI executive director. The first use of post-tensioning in

Technical exhibition

Parallel session

the U.S. was on the Walnut Lane Bridge in Philadelphia in 1949. The first use in building construction was in the mid to late 1950s using the lift-slab construction method. Early development of the prestressed concrete industry in North America was predominantly oriented toward factory production of precast pre stressed elements for highway bridges. In the 1960s, post-tensioned box girder bridges were widely used in California and other Western states. During the same period, the use of unbonded tendons for building floor systems became more widespread. The use of post-tensioned nuclear containment also began in the 1960s. The 1970s saw the emergence of new applications, including the use of post tensioned foundations for single and multi-family residences on expansive and compressible soils, and the use of prestressed rock and soil anchors. Since its first introduction in the U.S. almost 70 years ago, use of post-tensioning has increased steadily. In the early years, the growth was relatively slow. However, recently post-tensioning shipments in North America have increased more rapidly. Despite the recession of 2008 - 2011 that resulted in major cutbacks in U.S. construction spending, PT shipments have almost quadrupled in last 25 years. The largest use is for shallow concrete foundations for residential and light commercial construction (referred to as “slab-on-ground”), followed by buildings, bridges, and earthwork (primarily ground anchors). Approximately 90% is unbonded single strand (mono-strand) tendons, and the remainder bonded/grouted multi-strand or bar tendons. Recently, in the United States, there is a strong interest in corrosion control, and stainless and FRP tendons are attracting more attention.

In order to exchange information concerning activities, researches and original technologies 37 groups participated in the technical exhibition. Companies 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, 36 contributed papers, 109 reports and 4 introduction of research were presented in 18 sessions. The participants were 692. From each session, the most excellent presenters were chosen and were given “Award of Excellent Presentation”. Prize winners are as follows.

Session 1: *Akikazu Kugimiya*, Obayashi Corporation
Session 2: *Yoshikazu Suzuka*, Sumitomo Mitsui Construction Co., Ltd.

Workshop

Award of excellent presentation

Session 3: *Kouichiro Shimizu*, Sumitomo Mitsui Construction Co., Ltd.
Session 4: *Tsunehisa Yamaguchi*, Kajima Corporation
Session 5: *Shinji Watanabe*, Nippon P.S Co., Ltd.
Session 6: *Yuki Yokota*, Kajima Corporation
Session 7: *Norio Uemura*, P.S. Mitsubishi Construction Co., Ltd.
Session 8: *Kazuhiro Kozu*, Kurosawa Kensetsu Co., Ltd.
Session 9: *Atsushi Shibayama*, Central Research Institute of Electric Power Industry
Session 10: *Yuki Myojin*, Kawada Construction Co., Ltd.
Session 11: *Taisuke Fujioka*, Sumitomo Mitsui Construction Co., Ltd.
Session 12: *Naoki Sogabe*, Railway Technical Research Institute
Session 13: *Takehiko Harada*, Oriental Consultants Co., Ltd.
Session 14: *Hiromitsu Koyama*, BASF Japan Ltd.
Session 15: *Kanta Ono*, Sumitomo Mitsui Construction Co., Ltd.
Session 16: *Masayoshi Imamura*, P.S. Mitsubishi Construction Co., Ltd.
Session 17: *Seiichi Tamura*, Fuji P.S Corporation
Session 18: *Hironobu Wada*, Yokokawa - Nippon PS - Yoshida - Yoshinaga Construction JV

■ 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: kaiinka24@jpci.or.jp

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