JPCI Award 2019

【JPCI Award for Outstanding Paper】

● A Basic Study on Non-Destructive Evaluation Method for Detection of Grouting Condition in Tendon Ducts of PC Members by Electromagnetic Response of Steel Sheaths and Bars in Concrete

Shinichi HATTORI, Hiroki KIBE, Koki TERASAWA, Toshiro KAMADA
Journal of Prestressed Concrete, Japan, Vol. 61, No. 6

● Monitoring of Anchor Load by Optical Fiber Sensor-Embedded Strand

Naoki SOGABE, Michio IMAI, Shinji NAKAUE, Michihiro HAYAKAWA
The 27th Symposium on Developments in PRESTRESSED CONCRETE

【JPCI Award for Outstanding Structures】

Client : Central Nippon Expressway Co., Ltd
Design : Japan Bridge & Structure Institute, Inc
Sumitomo Mitsui Construction Co., Ltd
Construction : Sumitomo Mitsui Construction Co., Ltd

● Washimi Bridge

Location : Gujo City, Gifu Prefecture
Outline of Structure :
The Washimi Bridge (Phase II) is a 490.0m long bridge on the Tokai-Hokuriku expressway. It was designed to run adjacent to the current Phase I bridge spanning a deep valley, using a four-span continuous rigid frame prestressed reinforced concrete (PRC) box girder design with corrugated steel webs on three tall piers, the tallest of which is 125 m high and the tallest in Japan. Because the bridge is in a heavy snowfall region with severe weather conditions during construction, the rapid construction method was adopted to utilize precast elements during construction of the bridge piers. To speed up the construction of the superstructure, the rapid construction of corrugated steel webs method was used. This method boosts construction efficiency by installing the form traveler on the corrugated steel panels and enabling construction to progress on several blocks simultaneously.

Client : Central Nippon Expressway Co., Ltd.
Design : P.S. Mitsubishi Construction – Fuji P.S JV
Construction : P.S. Mitsubishi Construction – Fuji P.S JV

● The Second Komono Viaduct on the Shin-Meishin Expressway

Location : Komono-cho, Mie Prefecture
Outline of Structure :
The Second Komono Viaduct is a 19-span, 1,103-meter-long viaduct comprised of a 3-span prestressed reinforced concrete continuous extradosed bridge, sandwiched by two continuous box-girder bridges with 5 spans and 11 spans. Concerning the design, an attractive appearance of the sub- and super-structure was important in determining the form. Possessing a central span of 161 meters in length, the extradosed section of the viaduct has the nation's longest span for an extradosed bridge with a cross-sectional width wider than 20 meters, comprised of a single plane suspended section with concrete webs. To achieve this, the bridge structure employs 48S15.2B, which are the nation's heaviest load of cables for an extradosed bridge.

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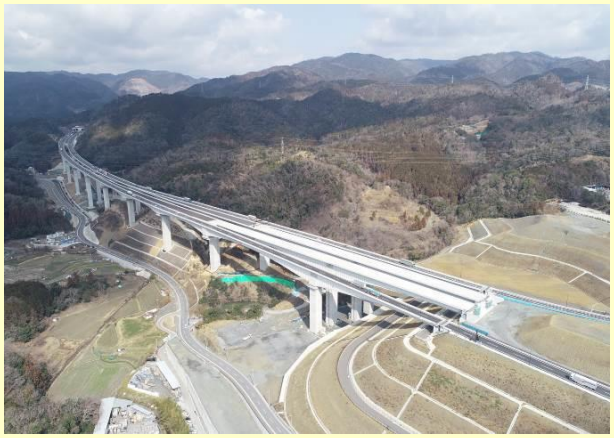


● Yobaisan Viaduct

Location : Takatsuki City, Osaka Prefecture
Outline of Structure :
Eastbound bridge: 12-span continuous PRC box girder bridge
Westbound bridge: 11-span continuous PRC box girder bridge
(Each bridge consists of a combination of concrete and corrugated steel web structures.)

Bridge length and spans:
Eastbound bridge: Main bridge: 1,106.5 m
(104.5+125.0+9x90.5+58.5 m)
Westbound bridge: Main bridge: 1,116.5 m
(116.6+155.4+2x100.0+6x97.0+58.5 m)

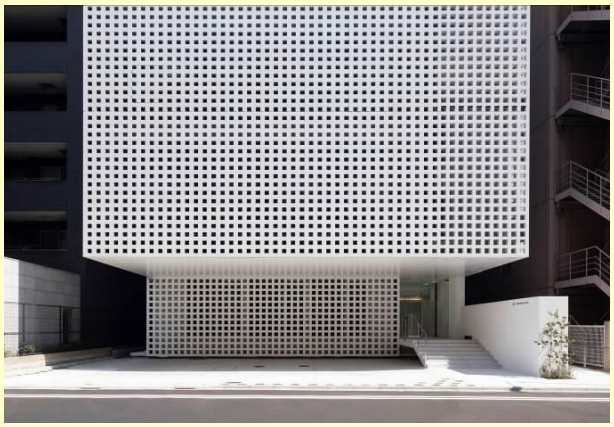
Girder height: 3.000 m to 12.000 m

Client : West Nippon Expressway Co., Ltd
Design : Oriental Consultants Co., Ltd
Sumitomo Mitsui Construction Co., Ltd,
Fuji P.S, Kyokuto Kowa Joint Venture
Construction : Sumitomo Mitsui Construction Co., Ltd,
Fuji P.S, Kyokuto Kowa Joint Venture

● NIPPO Headquarters

Location : Chuo City, Tokyo Prefecture
Outline of Structure :
The NIPPO headquarters building has acquired a very open space by planning the design, structure, and equipment in an integrated manner based on the concept of "junction" created from "extremely complicated location conditions" and "characteristics of NIPPO". At this head office, the pillar-shaped precast prestressed concrete (PCaPC construction) is adopted, which reduces the beam strain toward the northeast side where an open view can be obtained and increases the openness of the office space. In addition, the direct ceiling of the skeleton makes it a “space that attracts construction technology”, unique to the construction company's headquarters.

Client : NIPPPO CORPORATION
Design : NIHONSEKKEI, INC.
+NIPPO CORPORATION
Construction : NIPPO・DAI NIPPON CONSTRUCTION
Joint Venture for Construction Work
Construction (PC) : Oriental Shiraishi Corporation



● Kanda Holdings Headquarters

Location : Chiyoda-City, Tokyo Prefecture
Outline of Structure :
The most characteristic point of this office building is that about 50 percent of floor area has been supported by the cantilever structure. Saving energy and enhancing a work environment are design concepts, and this building has a hemi-exterior space to minimize the environmental load and to develop a communication between people. A 6.8 meters portion in depth from a front façade has been realized by pre-stressed concrete cantilever walls at both sides, this portion hangs over a space on the ground to provide both a parking space in a narrow construction site and a space open to the outside. Hence this building has realized high environmental performances and comfortable workspaces by utilizing this hemi-exterior space, and which are sustainable to both society and workers in this building.

Client : Kanda Holdings Co., Ltd.
Design : Takenaka Corporation
Construction : Takenaka Corporation
Construction (PC) : P.S. Mitsubishi Construction Co., Ltd

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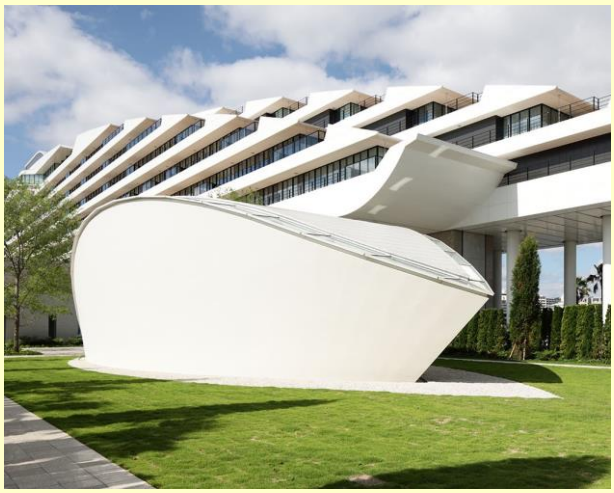


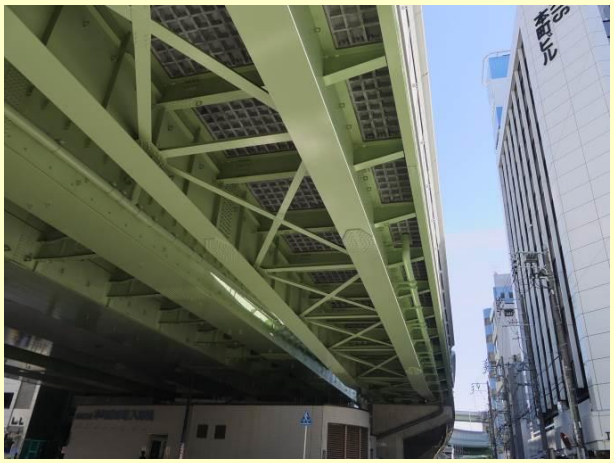
● Ashiya BayCourt Club Hotel & Spa Resort Chapel

Location : Ashiya City, Hyogo Prefecture
Outline of Structure :

By the prestress force introduced in the streamlined wall, we can make the seamless-shaped building without crack-inducing joint. Because this building is constructed near the coast “Ashiya Marina”, this seamless-shaped wall enhances the durability of the building, having corrosion resistance to the salt damage.
To achieve the engaging chapel construction, all the people concerned have carefully researched and examined the method for controlling crack.

Client : Resorttrust,Inc.
Design : NIKKEN SEKKEI LTD
Construction : KAJIMA CORPORATION

【JPCI Award for Outstanding Engineering Innovations】



● Waffle-Shaped UHPFRC Deck Slab

Location : Osaka City, Osaka Prefecture
Summary :

Waffle-Shaped Ultra High-Performance Fiber Reinforced Concrete (UHPFRC) deck slabs, which show high fatigue durability, have been developed as an alternative to orthotropic steel deck slabs. These newly developed slabs are the lightest of all concrete slabs for highway bridges. These slabs were applied to Shinamobashi rampway bridge for the first time in Japan. While conventional concrete slabs require three plate girders, waffle-shaped UHPFRC slabs require two plate girders for the bridge. To transfer large horizontal shear, UHPFRC is utilized as filler between the girders and slabs. Connection details between the precast panels are newly developed to replace accidentally damaged individual panels. These panels were prefabricated in a specially designed casting bed, which introduce bi-directional prestress. This combination of technologies assuredly improves service life of deck slabs for highway bridges.

Development : Hanshin Expressway Company Limited, Kajima Corporation

【JPCI Award for Outstanding Accomplishments of Constructions】

● Rapid Replacement Method for Railway Bridge Using UFC Hollow Girder

Location : Kitazawa, Setagaya City, Tokyo Prefecture
Outline of Structure :

The bridge near the Shimokitazawa Station of the Keio Inokashira Line is a three-span PC railway bridge, 67m in length, which was replaced for the existing steel bridge above the Odakyu Line. The central span is a 37m long PC girder bridge and side spans are precast hollow girders of 17m and 13m in length. As it was necessary to replace the bridges within a very short time between the last train and the first train of the following day, the girders of the side span are made of the UFC (Ultra High Strength Fiber Reinforced Concrete) and erected using a mobile crane in two stages. The central span was constructed by the lateral movement method using hydraulic jacks.

Client : Keio Corporation Co.,Ltd
Design : Fukken Engineering Co.,Ltd
Construction : TAISEI CORPORATION Co.,Ltd

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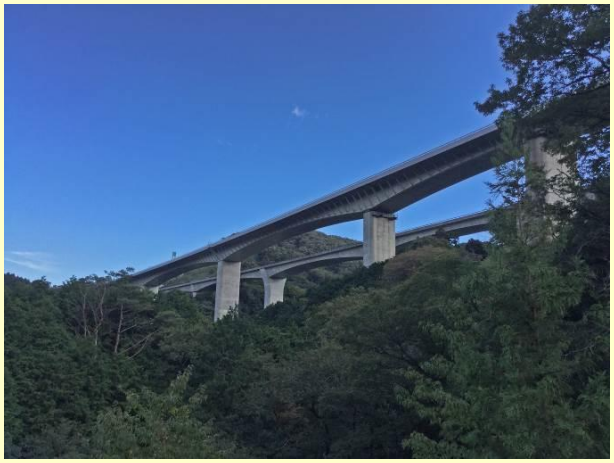
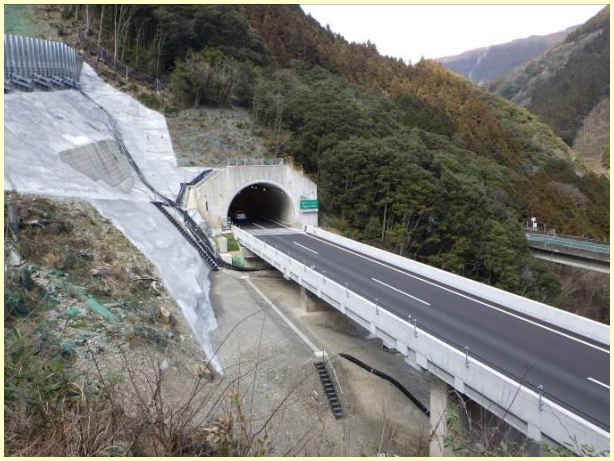
【JPCI Award for Outstanding Accomplishments of Constructions】



Client : Central Nippon Expressway Co., Ltd
Design : Japan Bridge & Structure Institute, Inc
Sumitomo Mitsui Construction Co., Ltd
Construction : Sumitomo Mitsui Construction Co., Ltd

● Widening works of Kirigataki Bridge (Kirigataki Bridge Widening Project)

Location : Kameyama City, Mie Prefecture
Outline of Structure :
Widening of Kirigataki Bridge is required to increase the number of lanes connecting to the Nagoya-Ise rampway opened in December 2019. During the construction, the traffic was busy, therefore, two lanes were required to ensure the flow of traffic. The top slab of the bridge was expanded while the two lanes were used for the flow of traffic. The construction yard on the bridge was narrow and heavy equipment could not be installed, then a technical form traveler system for barrier removal and top slab building was used for the construction. For additional of the external prestressing tendons, the existing anchorage plate could not be used, thus the new plate made from Ultra High-Performance Fiber Reinforced cement-based composites material was created.



Client : West Nippon Expressway Company Limited, Shikoku Branch Office
Design : NEXCO-West Consultants Company Limited
Construction : KAJIMA CORPORATION

● Disaster Recovery Project of Kochi Expressway Between Shingu IC and Otoyo IC

Location : Otoyo-cho, Nagaoka-gun, Kochi Prefecture
Outline of Structure :
63.5m long rebuilt Tajigawa bridge is a three-span connected hollow slab while the original bridge was a three-span continuous partially prestressed triple girder bridge that was swept away due to land slide caused by heavy rain in July 2018. To recover four-lane traffic as early as possible, SCBR method utilizing pre-tensioned precast hollow girders were adopted. Precast transverse girders were placed previously on the bearing pads to support all longitudinal hollow girders. The hollow girders were connected longitudinally on the transverse girders after erected as simple beams. Above erection procedure requires no additional support for the girders even after the completion. Consequently, the original substructures were used without any modification. Simultaneous works at the prefabrication factory and the erection site also shortened the recovery period. As a result, the bridge was rebuilt within one year after the disaster.