JPCI Award 2020

【JPCI Award for Outstanding Paper】

● The Shear Capacity of PC Beams Based on Beams and Arch Actions

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【JPCI Award for Outstanding Structures】

Client : West Japan Railway Company
Design : West Japan Railway Consultant Company
Construction : TAISEI CORPORATION – KOSEI CORPORATION JV

● Yaga Overpass Bridge

Location : Hiroshima City, Hiroshima Prefecture
Outline of Structure :

The Yaga overpass is a 322m long three-span continuous PC box-girder bridge and it forms part of Hiroshima expressway route No5 which connects Hiroshima Station and Nukushima Junction. In order to pass over a shinkansen depot, capable of accommodating 20 trains, the middle-span of the bridge had to be 152m, making it one of the largest constructed in Japan for this type of structure. On the other hand, steel pipe sheet pile foundation and high damping rubber bearing were adopted to mitigate the effect of earthquake load and future lane expansion workloads. Moreover, considering the maintenance and long-term durability, multi-layer anti-corrosive cables and high strength fiber-reinforced concrete were utilized. The bridge harmonizes with cherry blossom trees and Shinkansen, making a beautiful landscape and it also becomes a landmark for the region.

Client : Japan Water Agency
Design : Chodai Co., Ltd.
Construction : Sumitomo Mitsui Construction Co., Ltd.

● Egawa Bridge

Location : Asakura City, Fukuoka Prefecture
Outline of Structure :

Egawa Bridge is a prestressed concrete bridge with three-span continuous box-girder crossing the Egawa dam lake. It is a part of the replacement of national highway no. 500, among the Koishiwaragawa dam construction project. The bridge has a length of 339 m with two piers over the dam lake. The middle span of the bridge is 173 m, which is over 170 m, the largest continuous box-girder in Japan so far. Super-large-scale form travelers were used to construct the bridge with cantilever erection method.

In response to the requests of an early opening of the bridge from local residents and interruptions caused by three heavy rain disasters, many rapid construction methods were focused on and applied. Moreover, this bridge could reduce environmental impact and the architectural design of the bridge blends in with the natural environment of the dam lake.

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【JPCI Award for Outstanding Structures】

Client : Tochigi Prefecture
Design : Kume, AIS and Honzawa JV
Construction : Kajima, Masubuchi, Watanabe, Nasudoboku, Isobe and Hamaya JV

● Tochigi Sports Park Athletics Stadium

Location : Utsunomiya City, Tochigi Prefecture
Outline of Structure :

Focusing on making this building an environmentally symbiotic stadium that makes the best use of natural energy, we conducted a parametric design using a computer and derived a three-dimensional form as the optimum form that integrates architecture, structure, and equipment. Since the plane shape covers a wide range, precast (PCa) members are actively adopted in consideration of construction rationality, and especially on the elevation of the stadium, the concrete of the structural frame is exposed as it is, so the factory-made PCa It was used as a member. The stand frame is composed of step beams arranged in the radial direction and circumferential beams in the orthogonal direction thereof, and these beams are crimp-joined by on-site PC tension.

Client : Kita City
Design : Coelacnth K&H Architects / KAP Structural Engineers
Construction : Koshino-Kawada-Takayama JV
Construction (PC) : Oriental Shiraishi Co.,Ltd.

● Tabata Junior High School

Location : Kita City, Tokyo Prefecture
Outline of Structure :

It is the junior high school planned on the site of the former Takinogawa 7th Elementary School as a part of the Kita City school restructuring plan.
A gymnasium, swimming pool, 12 ordinary classrooms, and disaster prevention base functions were required on a narrow site of about 7,200 m^2 surrounded by houses. It was planned as a compact and three-dimensional junior high school consists of 8 story school building and 2 story gymnasium. Swimming pool and playground are located on each building's rooftop. The ground of the modified artificial turf blends in with adjacent open space and temple: thus, creates a local atmosphere leaving a memory of the city.
The high-rise school building is designed with a precast prestressed concrete structure to ensure high durability and construction precision while reducing construction noise as the site is adjacent to residential area. The exterior of this high-precision, and high-quality structure is a local educational facility that harmonizes with the local landscape; therefore, the school becomes the landmark of new area.

Client : Central Nippon Expressway Co., Ltd. Nagoya Branch Office
Design : Obayashi Corporation JFE Engineering Corporation
Construction : Obayashi Corporation JFE Engineering Corporation

● Replacement Work for Kamitagawa Bridge on Chuo Expressway

Location : Nakatsugawa City, Gifu Prefecture
Outline of Structure :

The original Kamitagawa Bridge was a four single-span PC composite girder bridges with a total length of 125m. The solutions for the challenge of the renovation work are: 1) The unique precast PC deck system have been developed and adopted to shorten the work period. 2) The four single-span bridges have been changed to a four-span continuous bridge with link-slab so that the serviceability has been improved and the water leakage from the expansion joints has been eliminated. In addition, the new deck connection technology with UFC and the full precast concrete barrier system were also applied. These new technologies highly contributed to the rapid construction such that three times quicker work and 120 days shortening of the construction period was achieved.

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【JPCI Award for Outstanding Engineering Innovations】

● Precasting of the PC outer tank

Location : Hitachi City, Ibaraki Prefecture

Outline of Structure :

"Precasting of the PC outer tank" is a technology to precast the PC outer tank for the above-ground PC LNG tanks in order to shorten the construction period and improve the productivity of on-site works. In the development of this technology, the structure of the joint parts of the precast panels was especially devised, and the precasting of the PC outer tank was realized for the first time in Japan. This technology was applied to the Hitachi LNG Terminal II of Tokyo Gas Co., Ltd., and was able to shorten the construction period by 11 months and improve the productivity by reducing the total number of workers by 40%, compared to the conventional in-place casting method.

Development : KAJIMA CORPORATION

【JPCI Award for Outstanding Accomplishments of Constructions】

● Route 1 Haneda Line Samezu Reclaimed Area the Renewal Project (Phase1)

Location : Higashi Shinagawa, Shinagawa City, Tokyo Prefecture

Outline of Structure :

The renewal project consists of 0.6 km of reclaimed land area, wherein a soil improvement of the existing embankment was done to stabilize the foundation for building box culverts on the top of the embankment. It is a part of the 1.9 km long of large-scale renewal construction project of Haneda line route no.1 of Metropolitan expressway.

Some precast technologies of bridge superstructure such as short line match casting method and prestressed concrete composite deck slab (prestressed concrete panels + cast-in-place slab) were applied to the box culvert structure, hence rapid construction, durability improvement, and reduction of site working were achieved.

Client : Metropolitan Expressway Co., Ltd., Tokyo, Japan

Design : Obayashi, Shimizu, Sumitomo Mitsui, Toa, AsunaroAoki, Kawada, TTK, MMB, Miyaji.
Renovations to the Pier Section of Higashi Shinagawa and Reclamation Area of Samezu on the Route 1 Haneda Line JV

Construction : Obayashi, Shimizu, Sumitomo Mitsui, Toa, AsunaroAoki, Kawada, TTK, MMB, Miyaji.
Renovations to the Pier Section of Higashi Shinagawa and Reclamation Area of Samezu on the Route 1 Haneda Line JV

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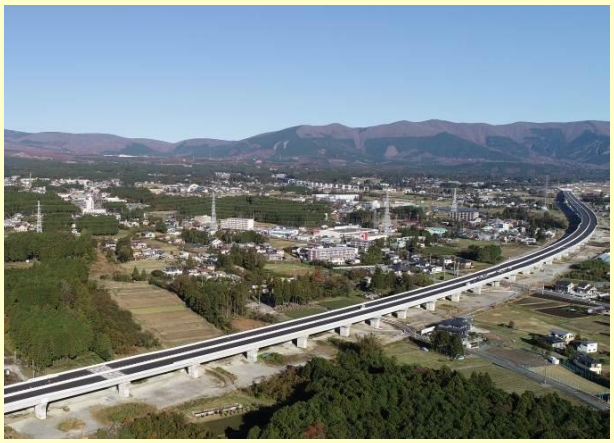
【JPCI Award for Outstanding Accomplishments of Constructions】



● Rationalization of U-girder Lifting Erection Method

Location : Gotemba City, Shizuoka Prefecture
Outline of Structure :
Shin-Gotenba viaduct is a multi-span continuous girder bridge with a total length of approximately 2.7 kilometer located near the Shin Gotemba interchange of the Shin Tomei Expressway. This work consists of Gumisawa-Kami viaduct, Gumisawa-Shimo viaduct, and Suginasawa-Daiichi viaduct. These viaducts are U shaped component type bridges and were constructed by the lifting erection method. The precast U-shaped girders were manufactured and transported on-site and then erected at once by the erection girder. In order to complete these bridges on time, the lifting erection method was further rationalized by some measures such as shortening the production cycle days, simplifying the precast girder structure and adopting the lifting erection using setting beams.

Client : Central Nippon Expressway Co., Ltd
Design : Sumitomo Mitsui Construction Co., Ltd. - Kawada Construction Co., Ltd. - DPS Bridge Works Co., Ltd. (JV) - Gumisawa-kami Viaduct -
Sumitomo Mitsui Construction Co., Ltd. - NIPPON P.S Co., Ltd. - KYOKUTO KOWA CORPORATION - DPS Bridge Works Co., Ltd. (Joint Venture) - Gumisawa-shimo Viaduct -
Sumitomo Mitsui Construction Co., Ltd. - NIPPON P.S Co., Ltd. - KYOKUTO KOWA CORPORATION - DPS Bridge Works Co., Ltd. (Joint Venture) - Suginasawa-Daiichi Viaduct -
Construction : Sumitomo Mitsui Construction Co., Ltd. - Kawada Construction Co., Ltd. - DPS Bridge Works Co., Ltd. (JV) - Gumisawa-kami Viaduct -
Sumitomo Mitsui Construction Co., Ltd. - NIPPON P.S Co., Ltd. - KYOKUTO KOWA CORPORATION - DPS Bridge Works Co., Ltd. (JV) - Gumisawa-shimo Viaduct -
Sumitomo Mitsui Construction Co., Ltd. - NIPPON P.S Co., Ltd. - KYOKUTO KOWA CORPORATION - DPS Bridge Works Co., Ltd. (JV) - Suginasawa-Daiichi Viaduct -

●Construction of Shinfurano No.A Bridge

Location : Furano City, Hokkaido Prefecture
Outline of Structure :
Shinfurano Bridge, which is located in Furano North Road section of Asahikawa Tokachi Road, is an 8-span continuous PC box girder bridge with a bridge length of 619 meters and spans Sorachi River that flows through Furano City. It is a bridge that plays a role in safe and convenient transportation while harmonizing beautiful Yubari Mountains and the rural scenery symbolizing Furano.
In this construction, even though it is an extremely cold environment where the minimum winter temperature dropped to -28℃ and diamond dust and rime on trees were confirmed, ICT (Information and Communication Technology) was actively utilized to realize the year-round cantilever construction. In addition, a completely automatic measurement system in a cantilever construction that enables a labor saving in measuring work has been developed and applied.

Client : Furano Road Office, Asahikawa Development and Construction Department, Hokkaido Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism of Japan
Design : Docon Corporation
Construction : Obayashi Corporation