No. 44 April 2015

STEEL CONSTRUCTION TODAY & TOMORROW

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"再 (*sai*)" in Japanese, or "re-, again" in English

Issue No. 44 highlights demolition technologies for high-rise buildings and bridges. The basic aim of demolition or dismantling is to renew, rebuild or reuse old structures.

Special Issue: Japanese Society of Steel Construction

Commendations for Outstanding Achievements in 2014

Special Feature: Demolition of High-rise Buildings and Bridges

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Big⇔Compact
ABENO HARUKAS Super Tall Compact City

Prize winners: Kiyoaki Hirakawa, Takenaka Corporation; and four other companies

ABENO HARUKAS is Japan's tallest skyscraper, standing at 300 meters, which was completed in March 2014 (Fig. 1). This building is a superhigh-rise vertical city with the gross floor area of approx. 212,000 square meters. Rising 60 stories above the ground and 5 underground stories, this tower incorporates diverse functions: a terminal station, a department store, an art museum, offices, a hotel, an observatory, parking spaces and more. No other building of this scale has been built above a station in any place throughout the world.

Special Features of ABENO HARUKAS

ABENO HARUKAS ("HARUKAS") stands out from other general skyscrapers because of the following three noteworthy features:

—This is a vertical city type skyscraper beyond the bounds of a mixed-use complex;
—The existing building was reconstructed into this skyscraper; and
—A high-grade vibration-damped building was constructed in Japan, one of the world's most earthquake and typhoon-ridden countries.

• Vertical City Type Skyscraper beyond Bounds of Mixed-use Complex

HARUKAS was so designed as to maximize the performances of a terminal station and many other uses and functions, which were shifted with different footprints and stacked.

HARUKAS is outstanding not only in that the activities of the functions in the city are vigorous and attractive but also in that the infrastructure through which they achieve their objectives is regarded as important, and all its factors are functionally, environmentally and structurally linked to one another.

Structurally, the vertically located voids are interlinked to the horizontal outriggers, which form a Linked Void Structure.

For the low-rise floors, vibration dampers are concentrated to absorb the energy caught by large shear deformation components, where the stairwells in the back-of-house area of the department store are laid out at the four corners of planes and used as vertical voids.

The mid-rise floor void has outriggers on the 15th and 37th floors and two 2-story braced outriggers located between them; one on the 25th floor and the other on the 31st floor. These outriggers suppress the deformations equivalent to the antinodes in higher vibration modes and work effectively to reduce the responses throughout the whole building.

Fig. 1 Frame Model

The high-rise floor void serves as a climbing passage for the cool air taken in from the 37th-floor outrigger and has a role of expanding the stance of the high-rise in a lateral direction.

• Existing Building Reconstructed into Skyscraper

HARUKAS is a reconstructed skyscraper above the terminal station used by Osaka's third largest number of passengers. This building is adjacent in the east to the existing high-rise department store which has been in business, connected to the low-rise department store of HARUKAS through a large void space.

Structurally, this void space serves as an expansion joint that will allow for the two buildings to move differently in case of earthquake.

• High-grade Vibration-damped Building Constructed in Japan, One of the World's Most Earthquake- and Typhoon-ridden Countries

Japan belongs to the region where both the design seismic and wind loads are the largest, and it would be no exaggeration to say that Japan is number one in the world in terms of the severity of disturbance.

Under the above conditions of external forces, we established the design criteria of HARUKAS to upgrade those of normal skyscrapers by one grade for this building, by allowing no member of this building to be plastically deformed against any Level-2 external force.

— Signature Building of Japan

The Linked Void Structure enabled us to realize ABENO HARUKAS that meets the architectural, environmental and structural requirements of the different approaches from those for the conventional skyscrapers and thus to create a worldwide recognizable signature building of Japan.

Construction of ABENO HARUKAS

The project site is situated in proximity to five conventional railway lines including two subway lines, and adjacent in the east to the main building of the department store in this new tower, which has been open for business. The Osaka Abenobashi Station used to be standing on the ground floor of the old department-store building reconstructed in this project. Therefore, construction of this tower required switchovers of passenger circulations while demolishing the old department-store building.

• Comprehensive Temporary Work Planning

Under such circumstances, it was a critical issue to secure the building materials carry-in/-out routes and construction yards. We brought the construction of some areas of the second and third floors into a later process and thus created a space that allowed a free traffic of large vehicles and heavy machines in order to solve the above issues.

Simultaneously, we separated the construction yard into the structural steel transport circulation route and excavated earth carry-out yard on the ground floor and the concrete mixer truck parking yard on the first basement floor.

During the erection of the office and hotel components, the setback rooftops of the 16th and 38th floor levels were used as the second and third construction yards for such purposes as temporary storage of members for the upper floor levels.

• Outline of Ground Work

Our top-priority issue was to ensure the accuracy of the special-shaped steel structure.

The building inclination of the office component turned out to be larger than those of the department store and hotel components, which was affected by the hotel component occupying only a half of the office component in the south and the higher axial rigidity of the long columns in the north of the office component. With the hotel component built on it, the relative displacement was approx. 30 mm, compared with the data acquired when the 38th floor was constructed.

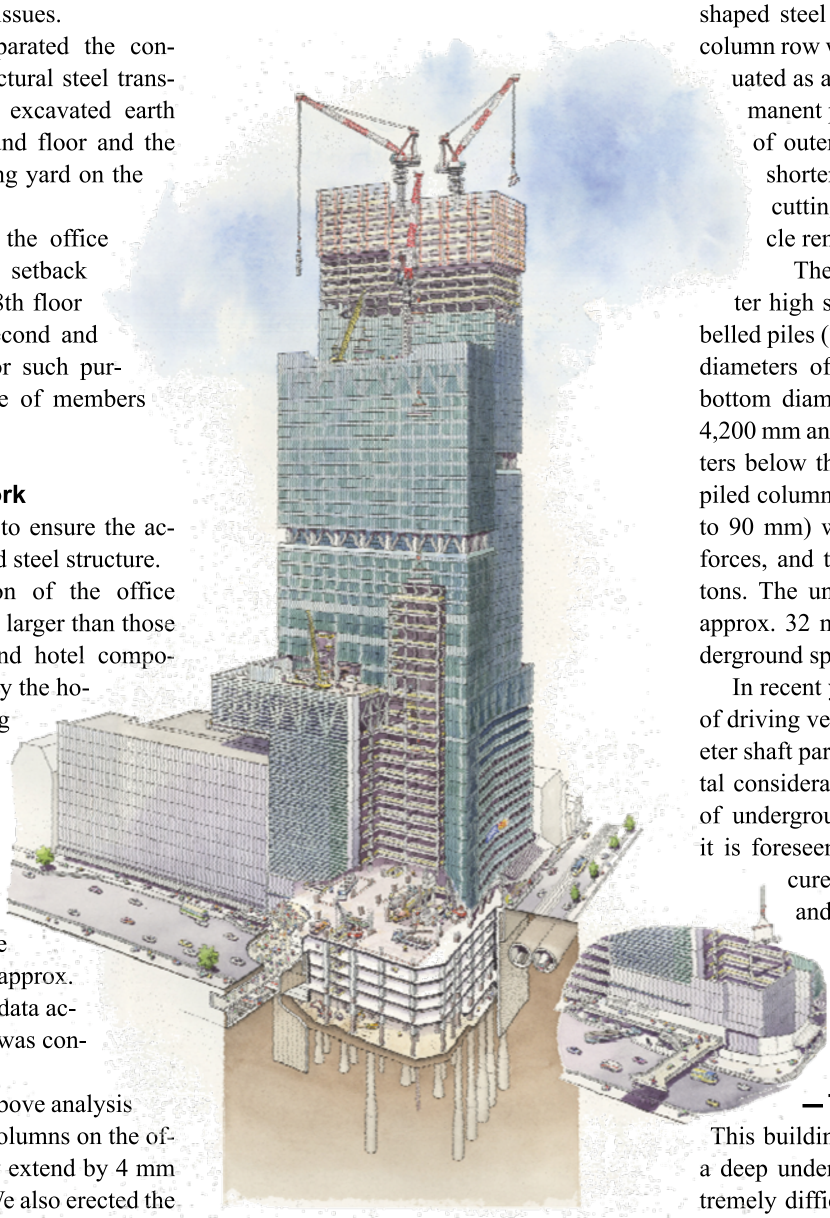
In accordance with the above analysis result, we fabricated steel columns on the office floors so that they may extend by 4 mm to 2 mm per erection unit. We also erected the structure by inclining the building itself by approx. 4 mm per erection unit to the north, based on the GPS measurements.

The maximum inclination of the building top based on the GPS measurements was 114 mm, and the vertical accuracy was 1/2632, which were within the scope of allowable control values. Consequently, we were able to prove the validity of the construction management approach that we applied to this project. On the other hand, the maximum deflection at the tip of the overhang was 9 mm, which was less than the target control value and enabled us to achieve extremely high accuracy of steel installation.

• Outline of Underground Work

We needed to excavate down to as deep as 30 meters below the surface of the ground, surrounded by five conventional railway lines. We used the high-rigidity TSW (Takenaka Soilcement Wall) Construction Method, one of our technologies, to enable this excavation to a great depth.

Fig. 2 Under Construction



The TSW Method uses soil cement made of excavated soil of the class and particle size adjusted on the ground, instead of concrete, which was placed into the excavated groove through a tremie tube. A continuous wall formed of this soil cement served as a temporary earth retaining wall and cut-off wall. Since this method recycles the excavated soil, it not only suppresses the generation of construction byproducts but also contributes to reducing the emission of exhaust gases from surplus soil transportation vehicles. Thus the TSW Method is an environmentally-friendly method. For the core of this earth retaining wall, such material as H-shaped steel is inserted as in a soil cement column row wall. Moreover, this wall is evaluated as a hybrid basement wall with permanent piles, which reduces the number of outer peripheral piles, consequently shortening the construction period and cutting down the underground obstacle removal cost.

The piles to support a 300 meter high skyscraper were in-situ concrete belled piles (Takenaka TMB Piles) with shaft diameters of 2,300 - 2,500 mm, expanded bottom diameters of tips that were 3,400 - 4,200 mm and pile tip level of approx. 73 meters below the ground. For the underground piled columns, extremely thick materials (up to 90 mm) were used to support high axial forces, and their weights were close to 100 tons. The underground piled columns were approx. 32 meters long due to the deep underground space.

In recent years, there has been a tendency of driving very strong piles with small-diameter shaft parts in economic and environmental considerations. Especially if pre-erection of underground piled columns is intended, it is foreseen that it will be difficult to secure clearances of control fixtures and tremie tubes. Against this background, we consider that there will be an increase of needs for the construction methods applied to this project.

— Tallest Building in Japan

This building not only is a skyscraper with a deep underground space but also was extremely difficult to build due to the location and other restrictions. Therefore, we have improved and developed a wide variety of construction methods. Currently, Japan's tallest vertical city is soaring in the land of Abeno, Osaka. ■

GINZA KABUKIZA

Prize winners: A Design Joint Venture by Mitsubishi Jisho Sekkei Inc. and Kengo Kuma and Associates, and Shimizu Corporation

In order to support 23 stories of office space above the Kabukiza Theater, which has a large void in plan, two 13 m-deep Mega-trusses, spanning 38.4 m, are installed at the fifth and sixth floors of the building.

Each Mega-truss carries five columns, and the total long-term axial load of the columns is about 9,000 tons. A high level of safety is designed into the Mega-truss by ensuring that the stresses generated in truss members are less than the allowable short-term stresses even under combined loading conditions that include the effects of vertical seismic motion during major earthquakes.

The following three goals were set as design targets in order to achieve not only high seismic safety of the building but a rational frame design for the standard floors above the Mega-truss.

- Eliminate excessive additional stress imposed on the upper structure due to the Vierendeel effect that is caused by vertical bending of the Mega-truss, if normal construction procedures were adopted; and achieve rational frame design for the standard floors
- Avoid redistribution of the vertical loading in the event that the upper floors' Vierendeel structure became plastic during a major earthquake; and to transfer the long-term axial loading of the columns to the Mega-truss reliably, hence achieve a highly stable structure
- Prevent harmful deformations in the façade, etc. associated with construction of the upper floors

As a result of careful study, it was decided early in the design stage to control vertical deflections at the seventh floor where columns connect to the top of the Mega-truss during construction. Also, it was decided to jack up the columns to match the bending produced by construction of the upper floors in order to maintain a horizontal alignment of the beams at the eighth floor.

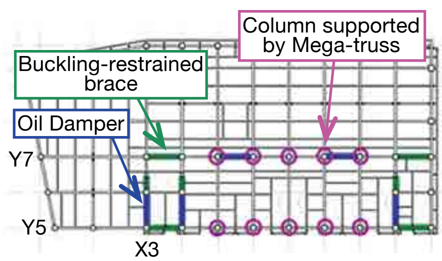
A high accuracy of ±2 mm was achieved to the target vertical deflection and the stress in the upper-floor structure was within the design target. ■

(Courtesy: Shochiku Co., Ltd. and Kabuki-za Co., Ltd.)

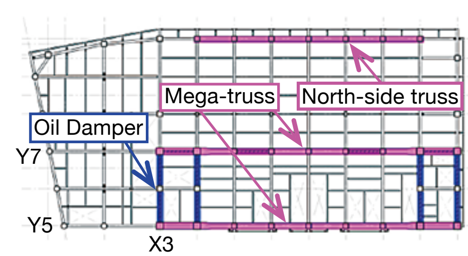
Overall view

Mega-truss

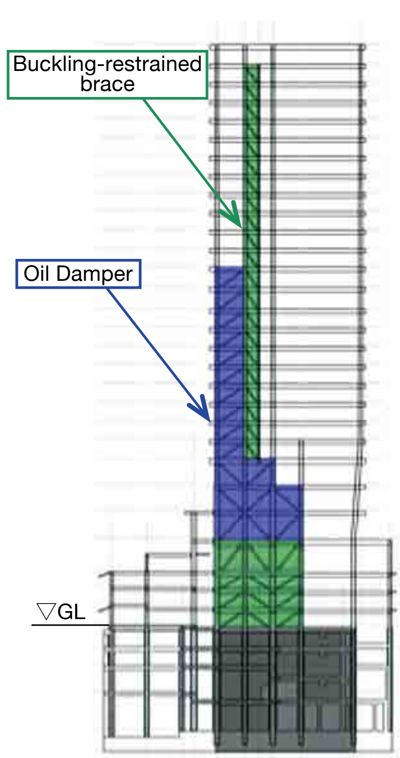
Typical Floor Plan



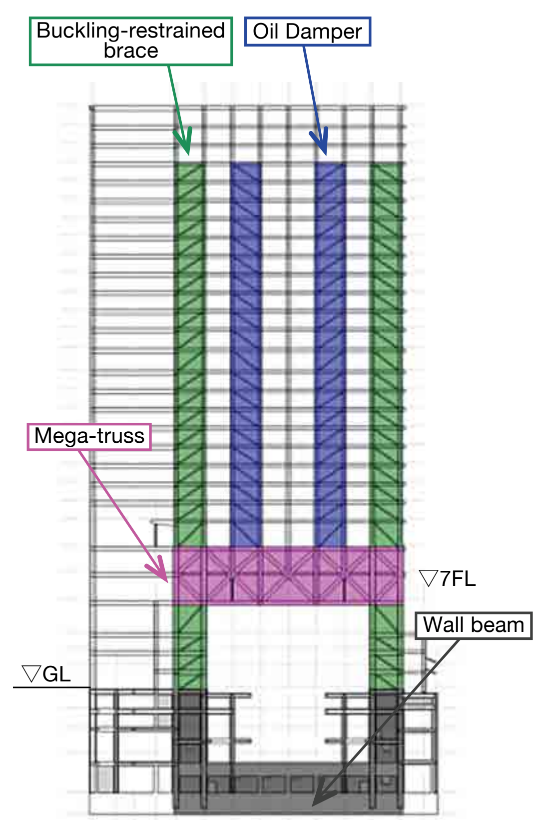
7th Floor Plan (Mega-truss Floor)



X3 Elevation



Y7 Elevation



Akasaka Center Building

Prize winners: Mikiko Kato, Noriaki Sato, Shohei Yamada and Mikio Yoshizawa, Nikken Sekkei Ltd., and Kazuo Tamura, Kajima Corporation

The Akasaka Center Building featuring steel-frame eaves is located in an area of abundant greenery in downtown Tokyo. The area is also noted as a historical and cultural site and lies adjacent to the Akasaka Goyochi (site of many imperial facilities) and Toyokawa Inari (a famous Buddhist temple).

Two notable features of the building are: an L-shaped configuration of the office space to ensure a fine view from the offices and the use of external peripheral framing columns to allow for the steel-frame eaves. The design concept relies on a "thoroughgoing use of steel," thereby leading to an extensive use of steel products for not only the structural members but also exterior and interior components.

The building, with a height of 100 m, is a steel-frame structure in which buckling-restraint braces have been adopted as the response-control members. The maximum span between columns is 24.6 m. Among the adopted column members are: 1,400 mm-diameter round steel tube columns that are arranged in the center of the building where the L-shaped office space is located, 900 mm-diameter round steel tube columns around the building periphery, and 1,000 mm square steel tube columns at the building's core. The strength rating of these columns ranges from 490 N/mm^2 to 590 N/mm^2, and all the members are concrete-filled steel tubes (CFT). A column-free structural plan is adopted for the building's corners to make fine, uninterrupted views available. The adopted girders are H shapes having a depth of 1 m and strength ratings of either 490 N/mm^2 or 550 N/mm^2.

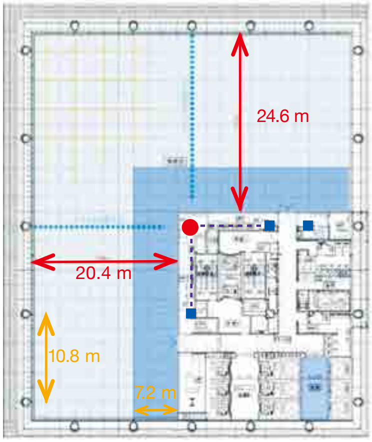
The exterior cladding for the columns and girders are hot-dip galvanized/phosphate-treated (ZnP) steel sheets that feature a beautiful spangled pattern. Because fire protection is provided on the heavy-duty corrosion protection-coated steel products and because ZnP steel sheet cladding is used as the finishing members, corrosion-protection maintenance is not required. Fine-surface ZnP steel sheets are also used as interior members for the steel ceilings and glass mullions in the entrance hall and for the exterior steel-frame eaves.

In this way, at the Akasaka Center Building, "steel architecture" has been realized that thoroughly utilizes steel frames for the building structure as well as the decorative members. ■

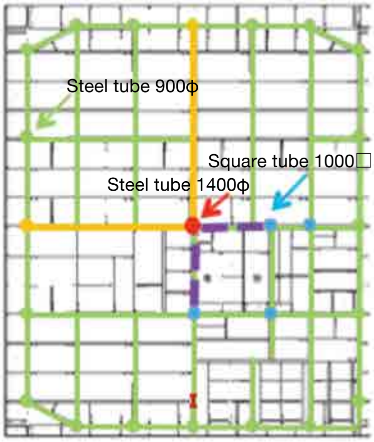

Appearance


Entrance hall

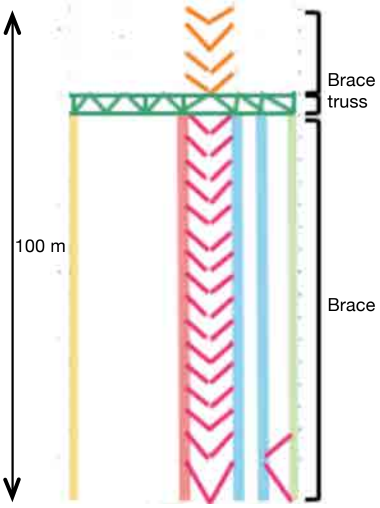
Plan at Standard Floor



Floor Plan at Standard Floor



Framing Elevation



Assessment of Equivalent Stiffness for Elasto-plastic Buckling Load of Eccentric Stiffening H-shape Compression Members with Different Stiffening Types

Prize winner: Yuuki Yoshino (Representative), Tohoku University

Yuuki Yoshino
2012: Graduated from Doctoral Course, Graduate School of Nagasaki University
2012: Entered Doctoral Course, Graduate School of Tohoku University
2015: Expected to graduate from Doctoral Course, Graduate School of Tohoku University

The elasto-plastic buckling strength of an H-shape compression member to which a non-structural member is attached (Fig. 1) differs in the elastic and inelastic ranges. In cases when the effect of different eccentric stiffeners is equally assessed, it has become possible to efficiently design eccentrically stiffened compression members in a space structure.

In the paper, a comparison is made of the elasto-plastic buckling properties of H-shape compression members between eccentric stiffening at the member center (Type A) and continuously eccentric stiffening (Type B).

When an equivalent stiffness curve (Fig. 2) is adopted that is obtained as the ratio of the horizontal stiffness ratio $_AK_u/_AK_{u0}$ of Type A on the horizontal line to the horizontal stiffness ratio $_BK_u'/_BK_{u0}$ of Type B on the vertical line, an elasto-plastic buckling strength can be found that is equal even in H-shape compression members having different stiffening types. ■

Fig. 1 Horizontal and Rotational Stiffness of Non-structural Member for Steel-frame Roof Member

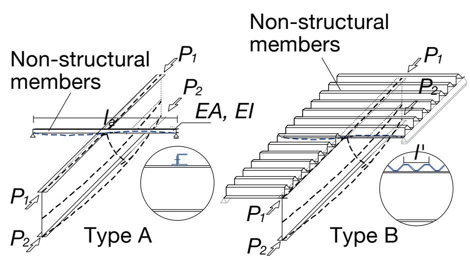
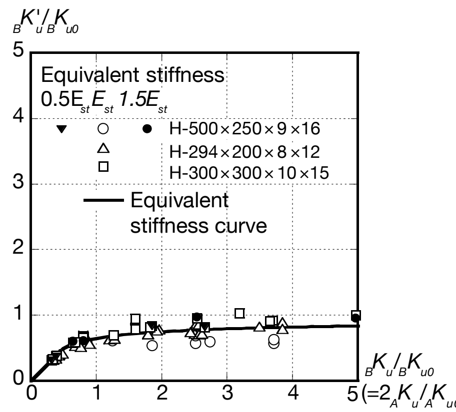


Fig. 2 Assessment of Equivalent Stiffness in Continuous Stiffening



Relationship between Seismic Design and Tsunami-resistant Design for Steel Structures

Prize winner: Fuminobu Ozaki, Nagoya University

Fuminobu Ozaki
2003: Graduated from Graduate School of Engineering
2007: Entered Nippon Steel Corporation (Steel Research Laboratories)
2013: Associate Professor, Graduate School of Environmental Studies, Nagoya University

The main objective of the paper is to comprehensively clarify the relationship between seismic design and tsunami-resistant design for steel structures.

The relation between seismic resistance and tsunami resistance was quantitatively assessed by applying seismic design (retained horizontal strength calculation) to a simply modeled steel structure model (Fig. 1) and by working the tsunami wave force of a tsunami-resistant design on the model. It was clarified in the assessment that there is a strong correlation between tsunami inundation depth and horizontal load-carrying capacity of a structure estimated by the seismic design (Fig. 2), which led to the strong recognition of the importance of seismic reinforcement for tsunami evacuation buildings constructed in conformance with the former seismic codes.

Seismic reinforcement is an approach that can improve not only seismic resistance but also tsunami wave resistance. On the other hand, even when a building is constructed conforming to the new seismic codes, there are cases in which tsunami resistance drops depending on the tsunami inundation depth. It was thus confirmed in the paper that tsunami-resistant reinforcement will be required in order to separately provide for buildings constructed based on the new seismic code. ■

Fig. 1 Simple Assessment Model of Steel Structure

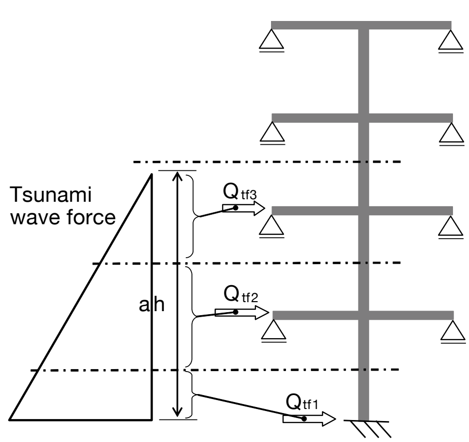
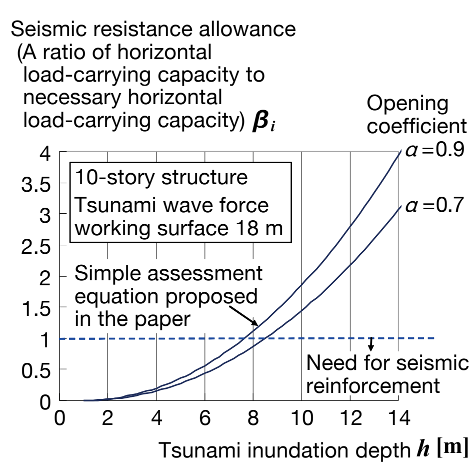


Fig. 2 Relation between Seismic Resistance Allowance and Tsunami Inundation Depth



Effects of Weld Toe Shape on Critical Condition of Brittle Fracture Occurrence during Earthquakes

Prize winner: Hiroshi Tamura, Associate Professor, Tokyo Institute of Technology

Hiroshi Tamura

2012: Finished Doctoral Course, Graduate School of Yokohama National University

2012: Associate Professor, Graduate School of Engineering, Tohoku University

2014: Associate Professor, Graduate School of Engineering & School of Engineering, Tokyo Institute of Technology

The brittle fracture that occurred in the Northridge Earthquake and the Great Hanshin Earthquake caused fatal damage that exceeded the design expectations in many steel structures. Brittle fracture of this kind is likely to break out from an initial shallow crack that is 1 mm or less in depth that occurs in the weld surface, and thus it was considered that the conventional brittle fracture condition cannot be applied to that fracture due to the effect of the weld shape.

Given such situations, in the current research, examination was made of a test specimen that can reproduce the effect of the weld toe shape of practical structures, and the effect of the weld toe shape working on the brittle fracture occurrence limit on the crack tip was assessed by means of a low-temperature fracture test and an analysis of local stress on the crack tip. As a result, it was clarified that the critical Weibull stress occurring at the time of brittle fracture propagation from a shallow crack depends on the crack depth and the weld toe radius. ■

Fig. 1 Test Specimen for Examining the Occurrence Limit of Brittle Fracture from Shallow Initial Crack

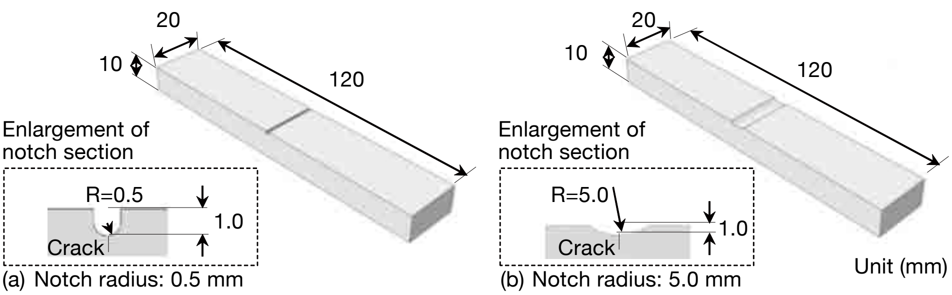
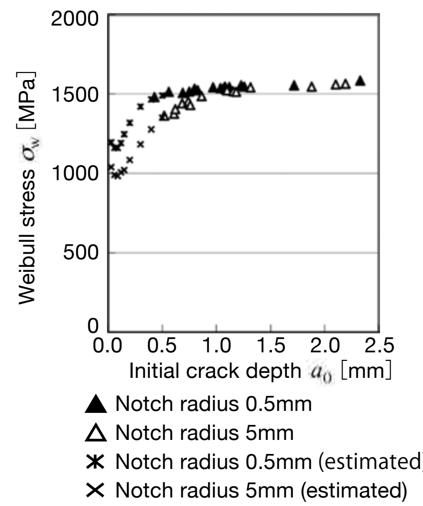


Fig. 2 Effect of Initial Crack Depth Found in Critical Weibull Stress during Brittle Fracture Propagation



Stochastic Evaluation of Hydrogen Uptake Affecting the Delayed Fracture of High-strength Bolts

Prize winners: Kazumi Matsuoka, Nobuyoshi Uno, Eiji Akiyama, Yukito Hagihara, Shinsaku Matsuyama, Hiroaki Harada

Kazumi Matsuoka

1978: Finished graduate school of engineering, Osaka University

1978: Entered Nippon Steel Corp.

2005: Finished Doctor Course of engineering, Osaka University

In evaluating the delayed fracture performance of high-strength bolts, it is necessary to settle two characteristic values: the local critical hydrogen concentrating of bolt H_C* and the local entry-hydrogen concentration of bolt H_E*. In the paper, the estimation was made of a pH level that drops in a rust film solution, which is required to calculate H_E*. The approach applied covers the following flow (Fig. 1).

(1) The accumulated fracture rate data of high-strength bolt, P_f, was obtained from a long-term 10-year exposure test conducted on 750 actual bolts.

(2) The statistical data was obtained by means of a CSRT test that was developed by Hagihara et. al. and acquires the local critical hydrogen concentration H_C*.

(3) A reliability analysis was applied to (1) and (2) above.

(4) The probability distribution of local entry-hydrogen concentration H_E* was determined by means of reverse analysis. Then, an analysis was made by comparing the probabilistic distribution with the controlled-pH solution immersion test results.

(5) Finally, it was concluded that the most appropriate pH level that drops in an outdoor rust film solution is slightly lower than pH 2. ■

Fig. 1 Analysis Flow of This Study

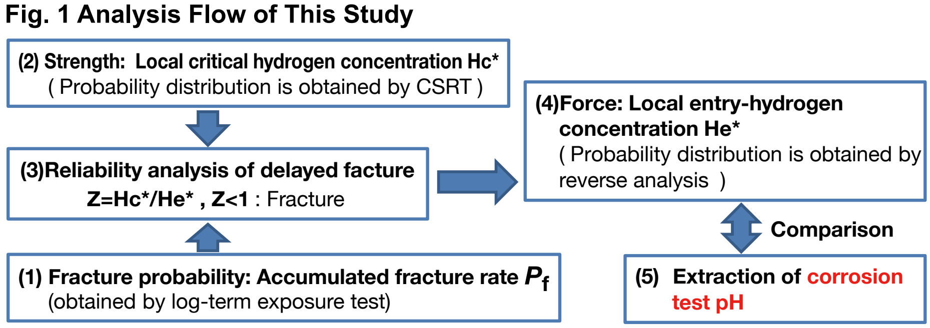
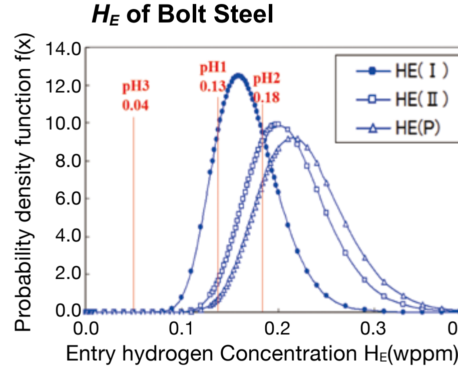


Fig. 2 Probability Density Function of Entry-Hydrogen Concentration H_E of Bolt Steel



Demolition of Steel Structures

In recent years, global environmental issues have taken on added importance. In this regard, the demolition of buildings and bridge structures is attracting considerable attention. Demolition is completely different from destruction and may appropriately be conceived of as preparatory for the establishment of recycling-oriented societies (societies with a reduced environmental burden) and as promoting recycling and reuse.

Emerging Needs for Restructuring of Superannuating Social Infrastructure

In Japan, societal needs are changing and a variety of structures and social infrastructures that support urban functions are becoming superannuated and are in need of reinforced disaster-prevention capabilities. This requires that the urban infrastructure that handles these issues be restructured. To that end, it is increasingly important to develop technologies that protect urban functions from harm during the process from structural demolition to renewal, to prevent any adverse effect on peripheral environments, to enable space-saving and shorter-term demolition and to skillfully control both time and space.

Demolition of High-rise Buildings and Dismantling of Bridges

In light of this, this issue (No. 44) features an article on steel-structure demolition and subsequent rebuilding methods and introduces practical examples of high-rise buildings and railway/highway bridges that have been demolished and rebuilt.

First, the demolition of high-rise buildings is discussed. In Japan, high-rise buildings that were erected to make effective use of the narrow parcels of land available in urban centers are now entering a stage of needed renewal or reconstruction. In response, safe and environmentally friendly demolition technologies have been developed that are being put into practical use. While the demolition of high-rise buildings is basically carried out by combining the use of reinforced-concrete and steel-structure demolition technologies, the actual technologies used differ depending on building height and other structural conditions. Among the demolition methods introduced in this feature article are the block demolition method using tower cranes, the cut and take down demolition method and the closed upper-floor demolition method.

Next, methods for dismantling bridges, typical social infrastructure, are discussed. In bridge dismantling projects, diverse kinds of restrictions are imposed on the dismantling of existing bridges, and the selection of an appropriate demolition method requires careful consideration. The current feature article introduces the various restrictive conditions that must be hurdled in the dismantling of railway and highway bridges. ■

Reverse construction demolition method

Closed demolition method

Cube cut demolition method

Simultaneous bridge dismantling method using barge

Cut and take down demolition method

Upper-floor closure-type demolition method

Rebuilding of highway bridge

Environmental Performance of Closed Demolition Method for High-rise Buildings

by Hideki Ichihara, Taisei Corporation

Urban redevelopment projects are increasing every year, and it is no longer unusual for the rebuilt high-rise buildings to exceed 100-m heights. With this growth, building demolition carried out in densely populated urban areas is being called upon to implement proper countermeasures to mitigate the effects of demolition work such as noise and dust on the surrounding environment. One effective approach for achieving this mitigation is the closed building demolition method.

In closed demolition work, a temporary closed space (like a cap) is erected on the topmost floor of the building that is to be demolished, and all activities from demolition to the collection and disposal of the demolished members take place within this closed space. Conventional demolition methods have generated concerns about the spread of dust and the propagation of noise in surrounding areas. The closed demolition method, however, can mitigate these concerns and greatly reduce the environmental burden imposed on the surroundings. Further, the method is environmentally friendly and can successfully secure a favorable working environment within the closed space.

Three Major Effects of Closed Demolition Method

The first effect of this method is the suppression of noise propagated to the surrounding area. This is achieved by constructing the closed space using highly effective sound-damping members and materials. In two recent demolition projects, noise damping was improved by 17~23 dB compared to conventional methods.

The second effect is the suppression of dust that would otherwise be scattered to the surrounding area. By enclosing the floors that are being demolished in the upper section of the building where strong winds blow, it is possible to recover the dust that is produced by the demolition work. When the main building of the old Akasaka Prince Hotel was demolished, more than 80% of all the dust generated was recovered within the closed space.

A third effect is the improvement of the hot and humid environment that is inherent in closed-space demolition. By solar radiation shading during the summer season, it is possible to reduce the wet-bulb globe temperature (WBGT) by 2°C compared to the outdoor temperature, thereby lessening the risk of heatstroke among workers.

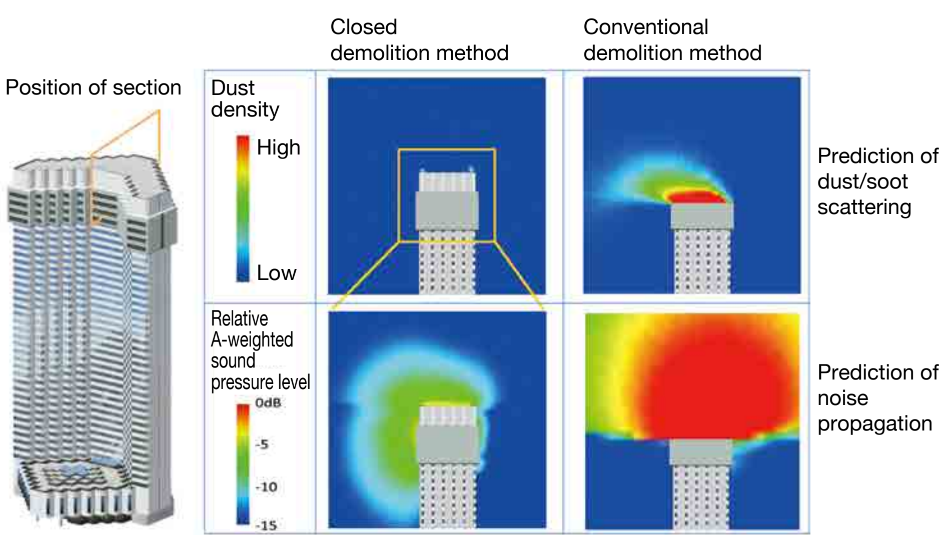
Table 1 Effect of Ventilation Amount on Environmental Factors

Environmental factor	Large ventilation amount (large ventilation opening)	Small ventilation amount (small ventilation opening)
Noise	Increase of demolition noise propagated to the outside	Increase of internal sound pressure level due to the closed space
Dust	Increase in the amount of demolition-induced dust scattered to the outside	Rise in the amount of internal dust density due to insufficient ventilation
Thermal condition	Colder working environment due to strong (cold) wind in winter season	Hotter working environment due to shortage of heat discharge in summer season

Design of Ventilation System for Closed Space

In order to mitigate the environmental effects of demolition through use of the closed demolition method, it is important to design a ventilation system for the closed space. As shown in Table 1, improvements to the working thermal environment, enhancement of the noise damping performance and reductions in the amount of scattered dust are largely governed by the size of the ventilation opening in the closed space. Furthermore, there is a trade-off relation between these factors. Therefore, it is most important to design an appropriate ventilation system by conducting simulations pertaining to dust generation, thermal environment and noise propagation, taking account of the season, the demolition area and the surrounding area (Table 1 and Fig. 1). ■

Fig. 1 Examination of Size of Ventilation Opening in Closed Space Upper Section by Simulation



Cut and Take Down Demolition Method

by Shigeru Yoshikai, Ryo Mizutani and Hitoshi Uehara, Kajima Corporation

Environmental considerations are important during building demolition, particularly in urban areas. The “Kajima cut and take down method” developed by Kajima Corporation is a package approach composed of various environmentally-friendly technologies and the jacking-down method in which a building is demolished starting from the lowest section, as if removing the lowest piece in a stack of barrels.

This method was applied in the demolition of the Resona Maruha Building, a rigid-frame 24-story building having a height of 108 m and a total floor area of 75,413 m². (Photo 1)

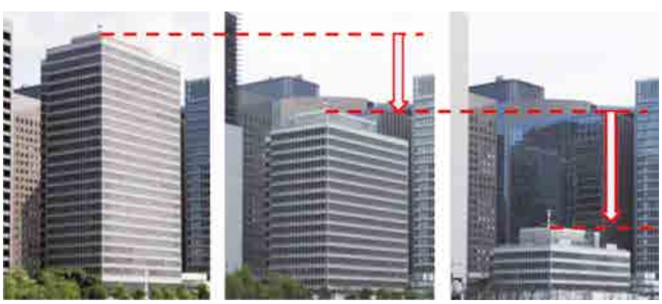


Photo 1 Full view of demolition employing cut and take down method

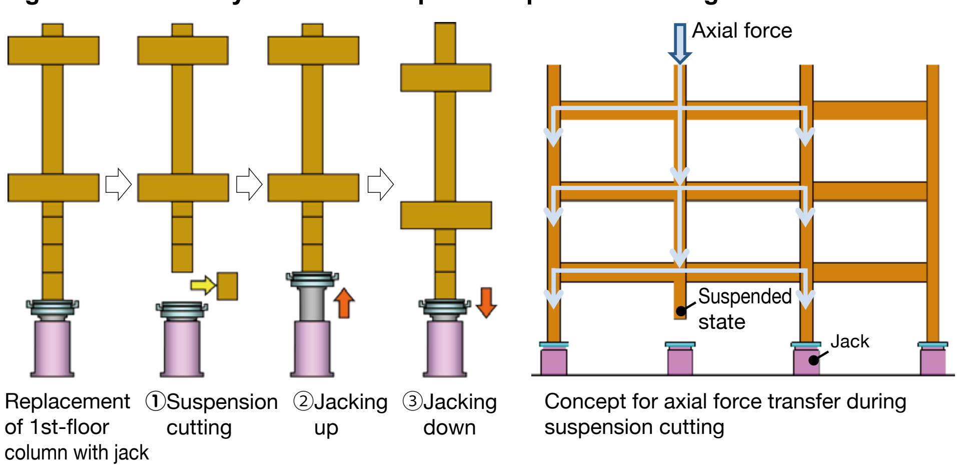
Outline of Method

In the cut and take down method, a core wall is installed to secure seismic resistance, the bottom of 1st-floor column is replaced with hydraulic jacks, after which the building is demolished 1 floor at a time, starting at the lowest level and moving upwards in the following cycle:

① Cutting of columns to 70 cm-long pieces by removing the jack load (suspension cutting)
② Supporting the columns by extending the jack (cutting all columns by repeating ① and ②)
③ Lowering the columns by means of simultaneous jacking down (lowering of each floor by repeating ①, ② and ③ by 5~6 times)
④ Demolition of beams and floors (Refer to Fig. 1)

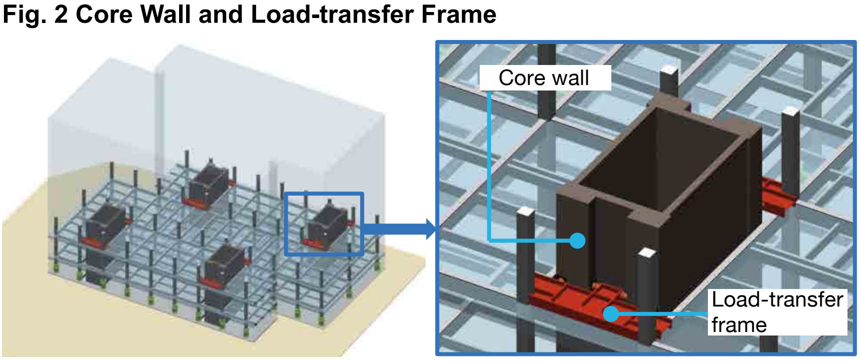
Demolition of the above-mentioned 24-story building was completed at a pace of 3 days/1 floor, or 3 months in total.

Fig. 1 Demolition Cycle and Concept of Suspension Cutting



Concept for axial force transfer during suspension cutting

Fig. 2 Core Wall and Load-transfer Frame



Securement of Seismic Resistance during Demolition

In demolition work using the cut and take down method, the columns are in condition of disconnection. In order to secure seismic resistance capable of withstanding a great earthquake during demolition, RC core walls with a height of about 13 m from the 1st-story floor and steel-structure load-transfer frames were devised and installed at 4 locations (Fig. 2).

Environmental Considerations

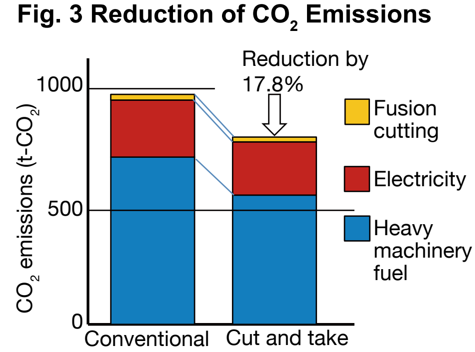
The cut and take down method is a highly eco-friendly method that efficiently suppresses CO_2 emissions. The adoption of this method allows a 17.8% reduction of CO_2 emissions compared to the conventional method of demolishing a building from the top floor down (Fig. 3). Among the factors contributing to this reduction are the use of larger-capacity heavy machinery and a reduction in the number of machines required, made possible by the performance of repetitive demolition operations at the same position; the resulting improved demolition efficiency; and the adoption of automatic gas cutters.

In addition, new devices and approaches have been introduced—air flow prediction analysis to prevent the scattering of dust and soot, micro electrical charge mist (μEC) to absorb dust and soot, noise propagation prediction analysis to suppress the propagation of noise and vibration, and an active noise control device (ANC).

◆◆◆

Demolition of the above-mentioned 24-story high-rise building located in an urban area was successfully completed by making the most of the seismic-resistant and eco-friendly cut and take down method. ■

Fig. 3 Reduction of CO_2 Emissions



Upper-floor Closure-type Demolition Method

by Masashi Morita, Takenaka Corporation

In the Takenaka Hat Down® method (enclosed upper-floor demolition method) developed by Takenaka Corporation, a building is demolished floor-by-floor as the movable demolition plant (hat) that encloses the top of the building is lowered (Photo 1).

Outline of Method

This method does not apply a conventional crusher; instead, it cuts the building into unit blocks with cutters and wire saws installed in the hat, thereby producing almost no soot, dust, or noise.

Further the hat is equipped with a retractable roof and overhead traveling cranes (with a power generation function for lowering cargo), which are used to lower demolished building blocks inside the building. As a result, there is no fear of flying or falling debris impacting the surrounding area, which, accordingly, makes the method effective for building demolition work in urban areas.

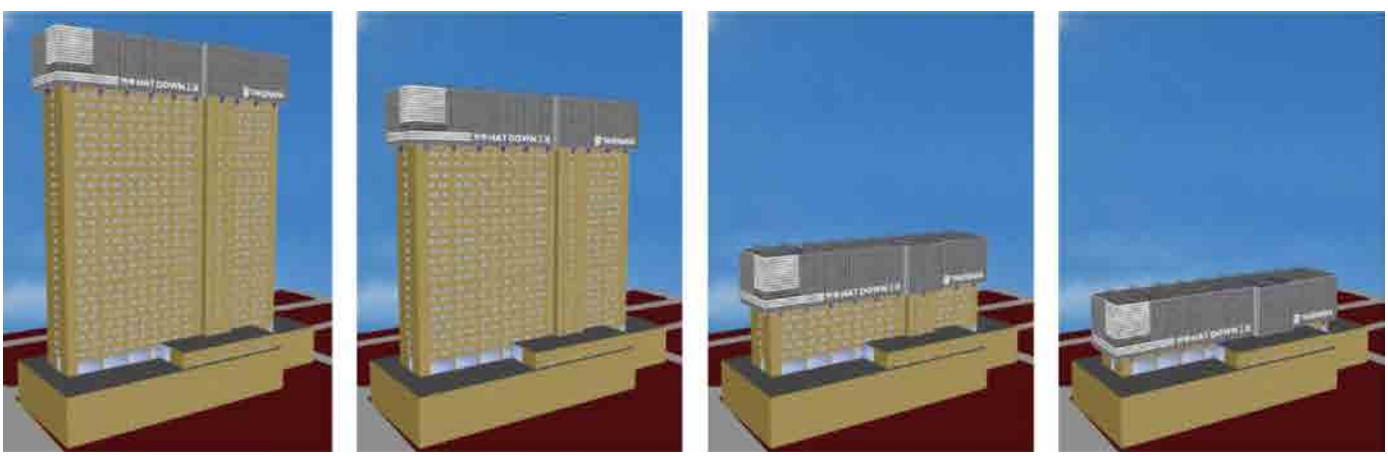
In addition, because the hat mechanism is supported by peripheral columns, in contrast to conventional methods, the Hat Down method does not require that a building structure be reinforced for demolition, and, further, this method can accommodate any structural configuration without reinforcement.

Application in the Demolition of a High-rise Building

The Hat Down method was adopted in the demolition of the former Hotel Plaza (88 m above-ground height) in February 2012. The main specifications of the hat were: 19 m in height, 19.6 m in width, 92.3 m in length, and 412 tons in gross weight (Photo 2); and, the hat was equipped with 3 overhead traveling cranes, each with a maximum suspension capacity of 7.5 tons. Further, the entire periphery of the hat was covered with sound-insulating panels and the ceiling of the hat was a retractable roofing membrane that was deployed according to the type of demolition work and in response to the weather, temperature and humidity conditions. (Photo 3)

A total of 22 jacks were arranged to raise and lower the hat. After demolition of the floor where the hat was located was complete, the entire hat structure was then lowered one floor, which would take about 1 hour.

The columns, walls and flooring of each floor were cut into 176 pieces, which were lowered through an opening provided inside the building employing the 3 overhead traveling cranes. The demolition of each floor was completed in 4 days. ■



Assembly of hat | Demolition of high-rise floor | Demolition of medium-rise floor | Demolition of hat and low-rise floor

Photo 1 Demolition process using Hat Down demolition method

Photo 2 Full view of movable demolition plant (hat)

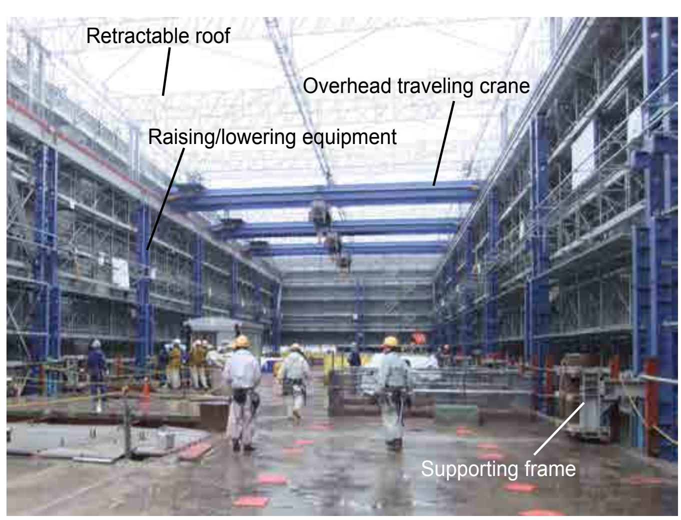


Photo 3 Demolition equipment in hat

Cube Cut Demolition Method

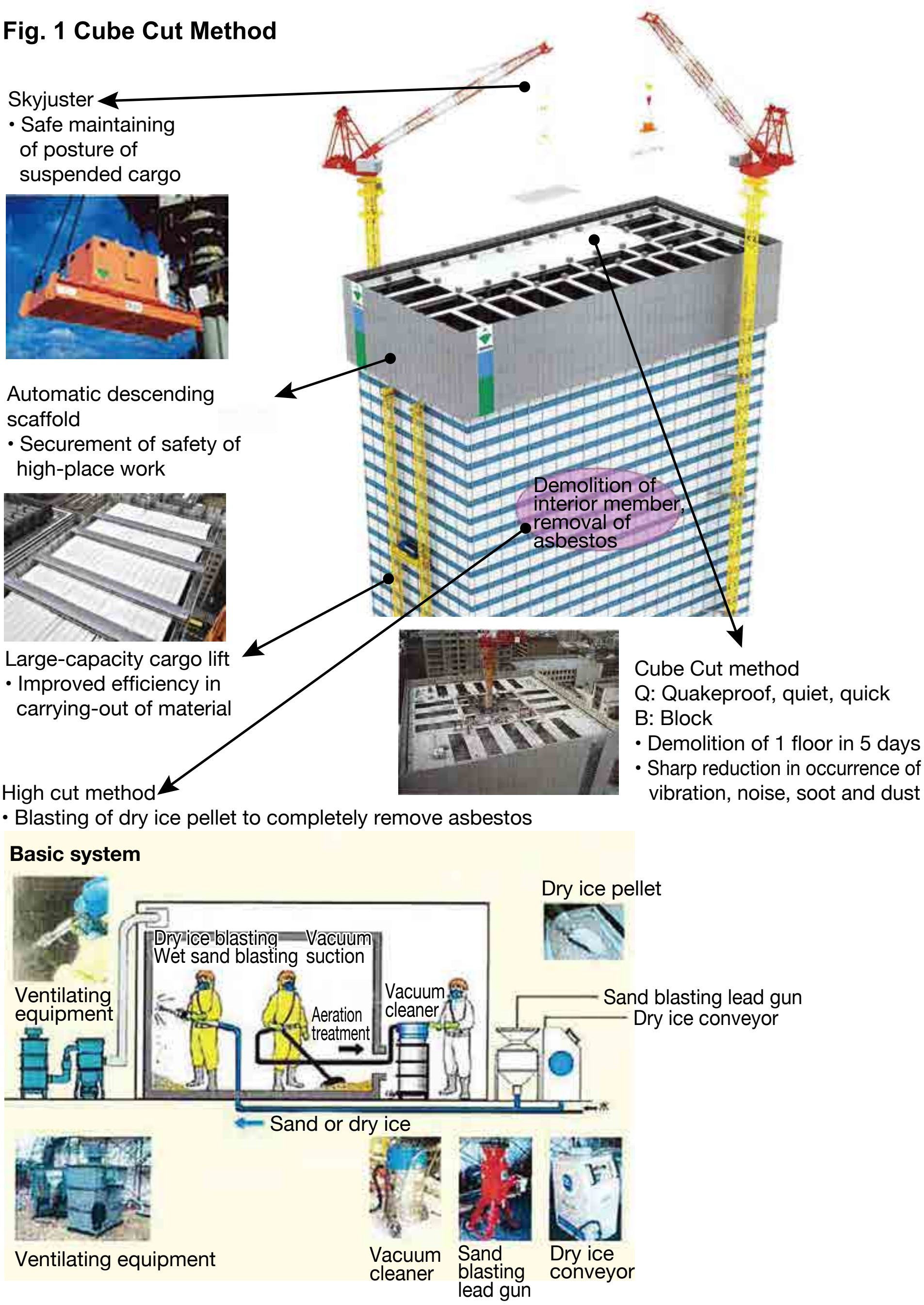
by Yoshihito Mizushima, Obayashi Corporation

Outline of Method

The "Cube Cut" demolition method (quake-proof, quiet, quick and block-by-block demolition method) has been developed by Obayashi Corporation. In this method, the building structure (columns, beams and flooring) is cut into blocks, which are then lowered to ground level where they are processed into smaller blocks and are separated (refer to Fig. 1 and Photo 1). Because crushers are not used on the top floor, pieces of crushed concrete are not scattered about and noise, vibration and soot/dust are effectively suppressed, making this an eco-friendly demolition method.

Further, this method can prevent building collapse during an earthquake. Seismic safety during demolition is secured by providing the appropriate procedures for cutting the structural frame and measures to prevent building collapse.

Fig. 1 Cube Cut Method



High Application Versatility and Short-term Demolition

In the Cube Cut method, it is possible to select a variety of elementary technologies, such as tower cranes, large-capacity cargo lifts, automatic-descending scaffolds and protection roofs, as the need arises. That is, it is a highly versatile demolition method that can meet every user need (cost, environment, etc.) and every demolition condition (structure, configuration, location, etc.). With a quick demolition rate of only 3 days/floor, this method has already been applied in the demolition of 6 buildings, each adjacent to a functioning hospital, hotel or office building (Photo 2).

In this method, the building structure is demolished by means of a static work system that does not involve the hammering or dropping. Because of this, it is possible to demolish the interior equipment and piping, to cut the floor slabs in advance, and to move the timbering for the demolished blocks on lower floors while, at the same time, continuing demolition work on the upper floor. This allows each process to proceed simultaneously, thereby reducing the total demolition term.

This method is cost-competitive, safe and rapid and can be applied in the demolition of not only high-rise buildings above 100 m but also those over 60 m in height. ■

Photo 1 Removal of columns and beams

Photo 2 Demolition using Cube Cut method

High-rise Building Demolition

Reverse Construction Demolition Method

by Nobuhiro Okuyama, Shimizu Corporation

The "SHIMIZU Reverse Construction Demolition Method," developed by Shimizu Corporation, is an approach that can greatly mitigate the environmental effect of demolition work of high-rise steel structure buildings. It allows highly reliable, economical demolition work that capitalizes on tower cranes and other general-purpose machinery (Photo 1)

Outline of Demolition Process

In the SHIMIZU Reverse Construction Demolition Method, crushing and breaking of structural members are done without conventional crushers, and on every floor, not only are the columns, girders and other steel-frame members gas-cut, but the floor slabs are cut using road cutters (Photos 2 and 3). In block demolition employing this method, the structural members are quietly cut while generating less dust and debris.

Then, in contrast to conventional demolition methods, the recovery of demolished members does not involve the free-fall dropping of demolished members, but instead uses tower cranes to quietly lower them without vibration.

Meanwhile, the conventional fully assembled scaffolding system adopted as the peripheral protection method in high-rise building demolition is considered difficult to apply because of its need for vast amounts of machinery and materials and because of its structural strength issue inherent in the use. Accordingly, the reverse construction demolition method uses a movable-type peripheral protection unit scaffolding system. This peripheral unit scaffolding is moved down for use for the lower floor employing the tower crane after finishing of demolition at respective floor (Photos 4 and 5).

In the planning stage of the current demolition method, a three-dimensional image was prepared based on the design drawing to confirm the demolition procedure and other tasks involved in demolition and to promote the demolition plan (Fig. 1).

General-purpose Demolition Method

In the practical application of the reverse construction demolition method, the noise level is reduced by about 20% compared to conventional breaking and crushing methods, and not only are vibrations diminished but also dust and debris generation is greatly reduced.

In addition, the use of a movable peripheral protection unit scaffolding system makes it possible to conduct demolition work without people in the surrounding area being aware of a project's progress.

In the method, because tower cranes and other general-purpose machinery are applied as the temporary machinery, no restrictions are imposed on the structural type or configuration of the building subjected to demolition. As an economical and general-purpose demolition method, the reverse construction method allows for versatile demolition plans to be worked out. ■

Photo 1 SHIMIZU Reverse Construction Demolition Method underway

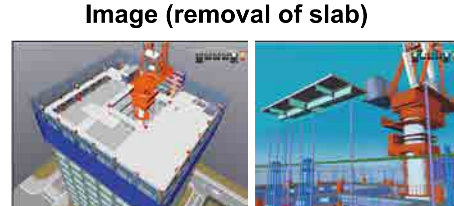
Photo 2 Cut and removal of concrete-filled steel tube column

Photo 3 Cutting of slab

Photo 4 Moving down of peripheral protection unit scaffolding for use for lower floor (moving down of 2 units in a lump)

Photo 5 A piece of movable peripheral protection unit scaffolding system (assembly into 2 units in a lump)

Fig. 1 Verification of Demolition Process Employing 3-dimensional Image (removal of slab)



Dismantling Methods for Steel Bridges

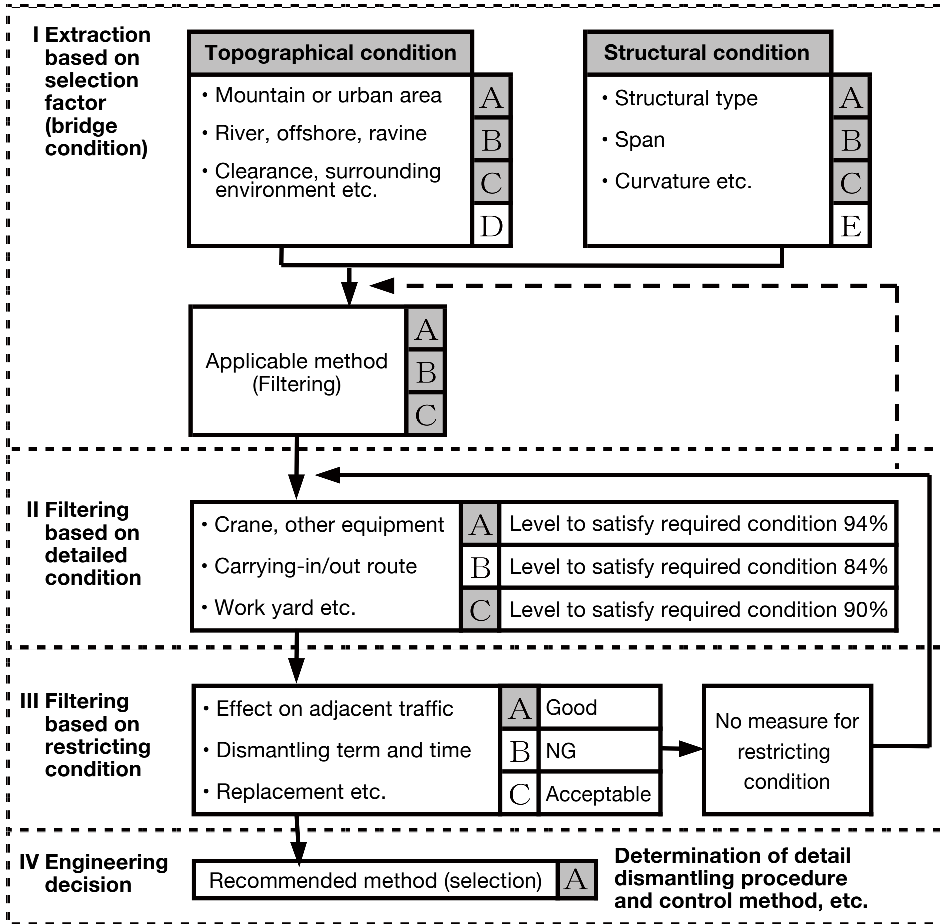
by Junichi Ikoshi, Yokogawa Construction Co., Ltd.

In steel bridge dismantlement, the imposition of various environment-related restrictions makes it impossible to simply reverse the original bridge erection process. Accordingly it is necessary in advance to work out a detailed plan that will satisfy a diverse range of conditions and requirements.

In general, the selection of an applicable dismantling method will take into account the structural characteristics of the bridge and the surrounding topographical conditions. Also, the selection process will include a detailed examination of the applicable on-site conditions related to the work yard and the heavy machinery to be used and with regard to restrictions and various other requirements such as keeping traffic capacity and minimizing the dismantling term. Then, conforming to these conditions and requirements, a specific dismantling method is selected that optimally combines the various dismantling equipment such as cranes, transporting systems (winches, jacks, carriages) and the temporary supporting members (bents, installation girders).

Fig. 1 shows the procedure for selecting the dismantling method. For example, in cases when bents can be installed in the space under the bridge and the yard for crane installation and block dismantling can be secured, the bent method using truck cranes is adopted (Photo 1). Or, in cases calling for the avoidance of dismantling work in the location of the existing bridge, a method to simultaneously dismantle the whole bridge structures is adopted that uses cranes and transporting systems that conform to the surrounding topographical conditions (Photos 2 and 3).

Fig. 1 Example of Selection of Bridge Dismantling Method



In bridge replacement in particular, numerous requirements will arise—the short-term replacement of an old bridge with a new bridge, the avoidance of traffic closures, and the restriction of work schedules to specified times such as nighttime. To this end, the key factor in the selection of a rebuilding method or plan is how to ensure safety, work efficiency, economic advantage and other inseparable issues and how to mitigate the effect of the rebuilding work on the surrounding environment and existing traffic.

These design, planning and dismantling/rebuilding technologies are where the engineers working in these fields can show their skills. These technologies are expected to be widely adopted in dismantling/rebuilding projects both in Japan and abroad. ■

Photo 1 Bent method using truck crane (block dismantling)

Photo 2 Simultaneous dismantling method for whole bridge structures using crane

Photo 3 Simultaneous dismantling method for whole bridge structures using barge

Replacement of Railway Bridges in Vietnam

by Masao Minagawa, Yokogawa Construction Co., Ltd.

The Hanoi-Ho Chi Minh Railway Line (approximately 1,700 km in total length) has been deteriorating due to damage during the Vietnam War and to superannuation. In order to improve the safety of the bridges on the line, the project has been planned that promotes the improvement of 44 of the damaged railway bridges spanning rivers. The main aim of the project is to secure railway service safety, to enhance transport efficiency and to promote distribution services between the northern and southern areas of Vietnam, thereby contributing to the sustainable development of the national economy.

Between 2003 and 2007 improvements were completed on 19 bridges with Official Development Assistance (ODA) from Japan. This led to a considerable reduction of travel time from the conventional 36 hours to 29 hours between Hanoi and Ho Chi Minh City. The remaining ODA railway improvement projects are currently underway and will result in improvements to all 44 bridges, further cutting the travel time to 24 hours.

The railway line is operated by means of a single track system. Of the bridges subjected to replacement, about 90% will be improved by the "replacement during window time" method in which the old bridge is replaced with a new bridge while railway operations are temporarily suspended for several hours. The remaining 10% of bridges are to be newly installed at the moved railway line in order to ease the railway curvature.

I was involved in the Construction Package No. 2 (CP2) and the Construction Package No. 1-D (CP1D).

The works on the No. 20 Truoi Bridge (CP2) located in the central part of Vietnam (Fig. 1) are introduced in this

Fig. 1 Location of Replacement Project

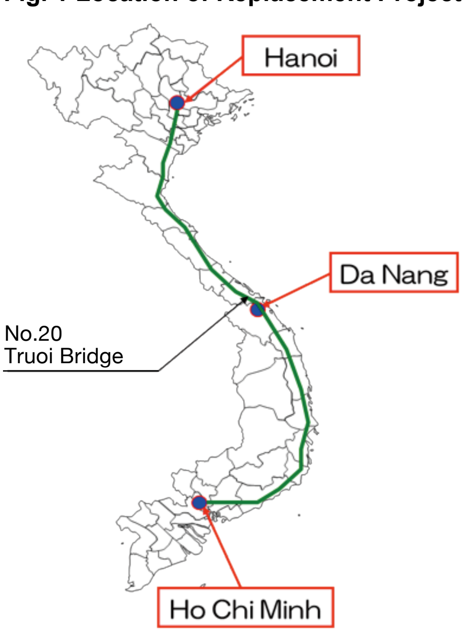
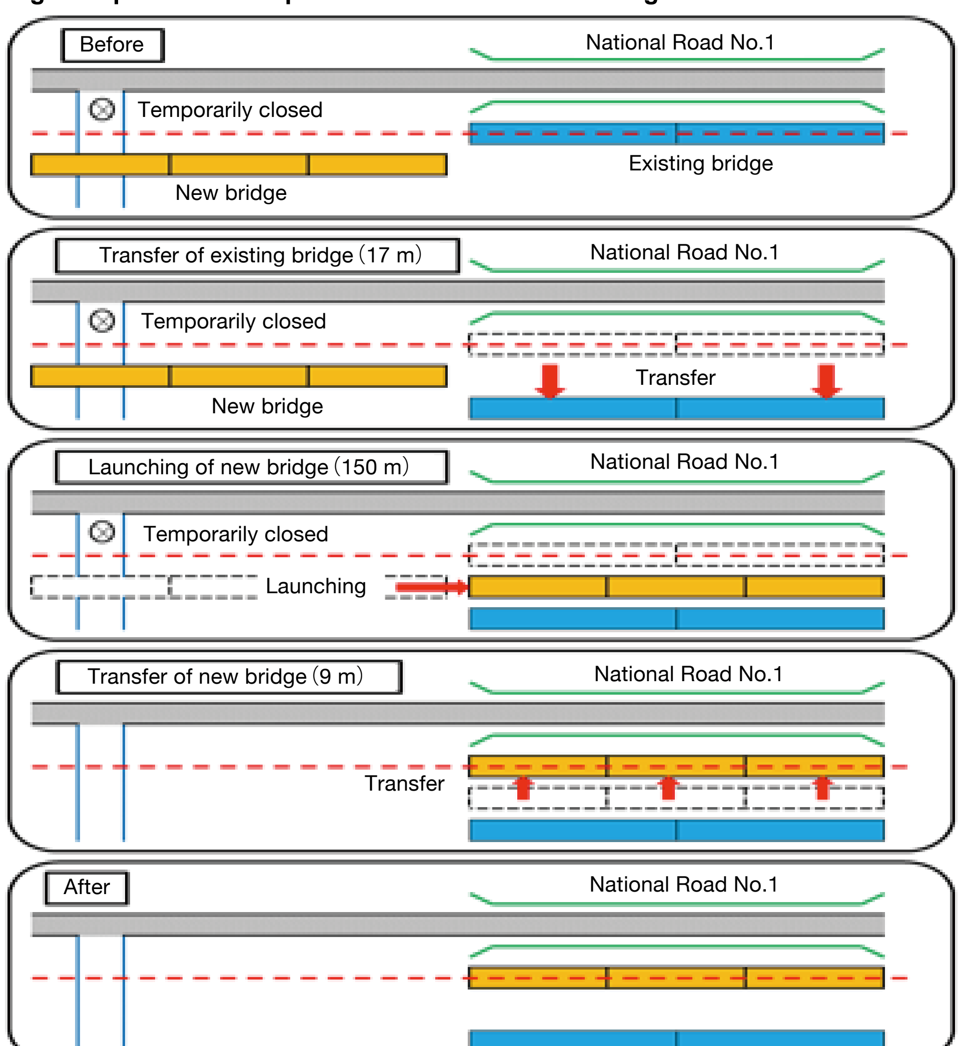


Photo 1 Yard assembly of new bridge at No. 20 Truoi Bridge site

Fig. 2 Replacement Steps Taken for No. 20 Truoi Bridge



article, which had been regarded as the most difficult in the 44 bridge improvement projects. The works include the replacement of 2 continuous curved chord Warren trusses with 3 continuous Warren trusses.

Replacement of the No. 20 Truoi Bridge during Window Time

In the conventional replacement during window time, the new bridge is assembled in advance at yard adjacent to the existing bridge on which the train runs, and on the day when railway operations are suspended, the existing bridge is moved laterally to the opposite side of the yard and the new bridge is laterally transferred to the vacant space and fixed.

However, in the No. 20 Truoi Bridge replacement project, because a bridge on the national highway is located only 4 m away on the downstream side from the bridge, the normal lateral transfer method could not be applied. As a result of studies, a method was adopted by which the new bridge was assembled in advance behind the existing bridge (Photo 1); then, on the day of replacement, a complex method was implemented combining the use of lateral and longitudinal transfers: lateral transfer of existing bridge→longitudinal transfer of new bridge→lateral transfer of new bridge (see Fig. 2 and Photos 2,3). The replacement of the bridge was to be completed within 6 hours.

Lateral Transfer of Bridges

In recent bridge replacement projects in Japan, the mainstream device in lateral transfers is the lateral-transfer jack, which does not allow significant deviation in moving and can easily make precise adjustments. On the other hand, in Vietnam, because of frequent power failures and difficulty of repairing hydraulic system, the combined use of mechanical systems that require no electricity was adopted: TIRTANK (roller moving system) as the transfer device, manual winches on the tension side and TIRFOR (manual endless winch) on the running-away prevention side.

Photo 2 Lateral transfer of existing bridge at No. 20 Truoi Bridge site

Further, direct fastened tracks (ballast-less tracks) were adopted for the No. 20 Truoi Bridge. So, time is needed to fasten the rails after a lateral transfer, and thus the rails were fastened in advance. Further, all simple truss bridges were connected at lower chords to mitigate the load working on the direct rail fastening system during lateral transfer.

During lateral transfer, because a difference in lateral tension between each bridge pier and the abutment of the new bridge may occur, control of the strokes (transfer amount) of the entire bridge structure became a key issue. In the project, the lateral transfer of the abutment parts with less traction force was preceded. And as a result the entire bridge structure including the rails tended to cause angles at the bridge pier parts. In such case, in order to mitigate the effect working on the rail-fastening device in a timely manner, the replacement work was conducted correcting the direction of movement of the TIRTANK.

Lowering of New Bridge onto the Bridge Piers

After lateral transfer of the new bridge, the new bridge was lowered by a margin of the mechanical height of the TIRTANK (about 150 mm) in order to secure the prescribed rail height. During lowering operation, how to lower the new bridge onto the bridge piers at a low speed and how to synchronize the four support points became an important issue in order to mitigate the load working on the direct rail fastening system (Photo 4). Commonly in Japan, 4 interlocked electric pumps are used. However, because of the power supply situation stated earlier, a manual pump was arranged for each jack to implement the lowering operation.

On the day of replacement, all operations went smoothly, and the replacement process of the No. 20 Truoi Bridge was successfully completed in 5 hours, 1 hour less than the planned 6-hour work time. ■

Photo 3 Lateral transfer of new bridge at No. 20 Truoi Bridge

Photo 4 Direct rail fastening system for directly laid railway

Girder Removal in Rebuilding of Highway Bridge on Metropolitan Expressway

by Yasuhiro Kakinuma and Atsushi Fukui, IHI Infrastructure Systems Co., Ltd.

Due to the improvement of the Loop Road No. 2, one of the urban planning highway projects of the Tokyo metropolitan government, the Yaesu Route of the Metropolitan Expressway interferes with a section of the Loop Road No. 2 that is planned as an underground tunnel. This requires that the section of the Yaesu Route that is causing the interference be rebuilt.

In the following, we primarily describe the removal of an existing bridge girder on the Yaesu Route that was ordered by Tokyo Metropolitan Expressway Company Limited (refer to Figs. 1 and 2).

Outline and Features of Existing Bridge Girder Removal

• Removal of Concrete Slabs

The method selected for concrete slab removal took into account the resulting effect on vehicle traffic under the existing bridge and surrounding areas. Specifically, both dry-type wire saws and concrete cutters that do not require cooling water were adopted, and the concrete slabs were cut into blocks (2.1 m × 3.8 m) and removed to avoid onsite crushing.

In order to cut off the main girder from the slab in the box girder (non-composite girder) section, the low-noise, high-efficiency jack-up method was adopted (Photo 1). In the case of the plate girder (composite girder) section, the slabs on the main girder flange were left, and the slabs between the girders were suspended using a crane and then were cut off.

• Removal of Existing Bridge Girder at Crossing

Diverse restrictions were imposed on the removal of the bridge girder installed at the Shiosakibashi crossing—reduction in the number of traffic closures, a narrow work space and a short 5-hour limit on traffic closures, safety concerns and the effect of the work on the surrounding area. To cope with these conditions, the nighttime large-block removal method using transporters (multi-axle trucks) was adopted to remove the center span section of a 3-span continuous box girder (Fig. 3).

Two transporters, each with 8 axles, were aligned in a row, and lifters were installed on the transporters to lift the girder up and down (Fig. 4, Photo 2). To prepare for the use of transporters, advance track simulations were conducted to discover obstacles on the route and to take appropriate measures for removed girder transfer, and the running route was marked on the pavement.

When the center span section of the 3-span continuous box girder was first removed, the both side span became the simple girder, where the positive bending moment increased. As a result, the main girder stress surpassed the allowable level. To cope with this, removal of pavement, slabs and concrete barrier curb preceded removal of the center-span girder.

The center-span girder (weight: about 250 tons; length: 26 m) to be removed was temporarily supported in advance using a setting beam, and while applying gas cutting, the girder was joined using a temporary splice plate. The temporary splice plate served as a safety measure for any possible fall of the setting beam and for suppressing the rapid release of internal stress during gas cutting. Further, supposing the case in which the removal of the bolt joined to the splice plate might become difficult, a jack was installed on both the upper and lower flanges

Photo 1 Concrete slab removal by means of jack-up method

Fig. 1 Location of Rebuilding Project

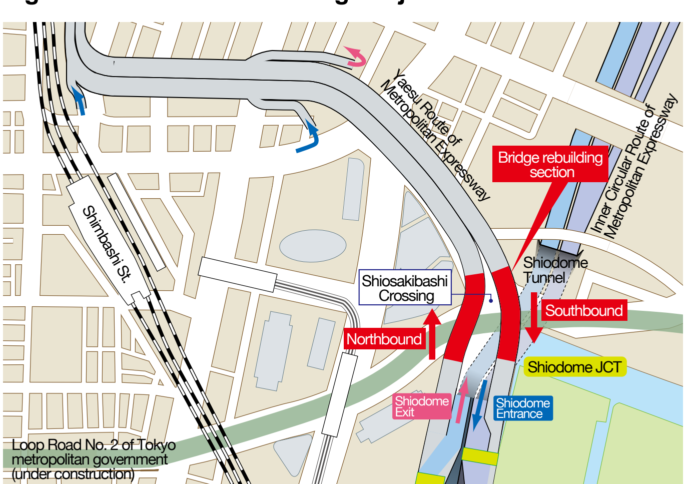


Fig. 2 Outline of Rebuilding Project

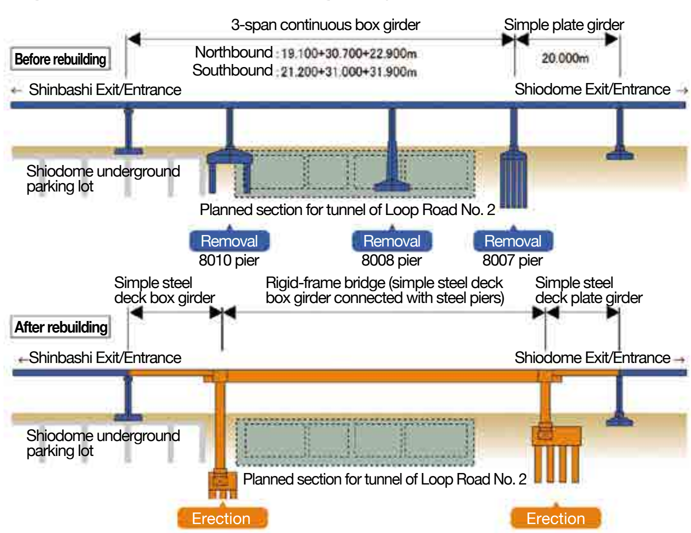


Fig. 3 Girder Removal Method

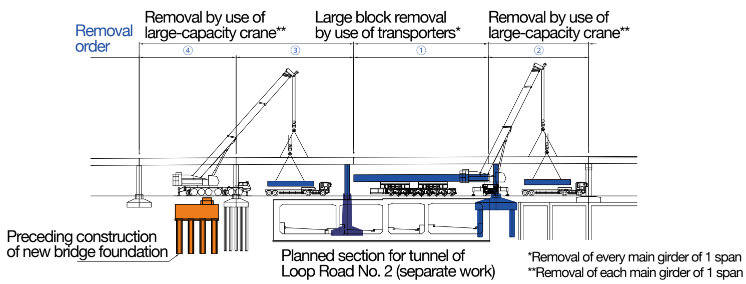


Fig. 4 Lifting Up and Down of Girder by Use of Transporter

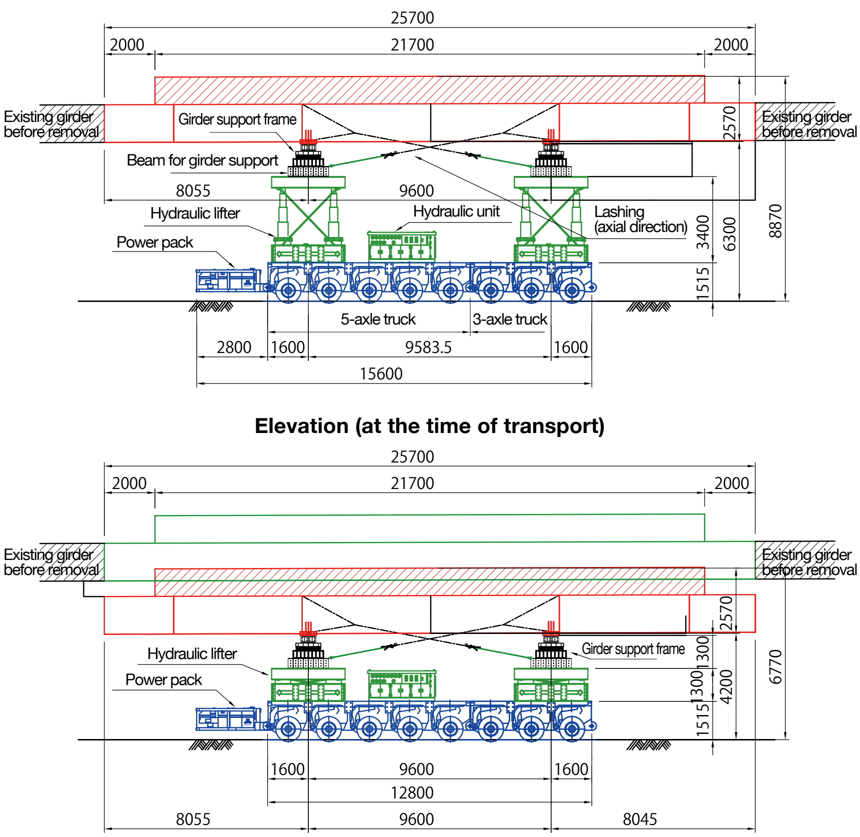


Fig. 5 Temporary Supporting Equipment

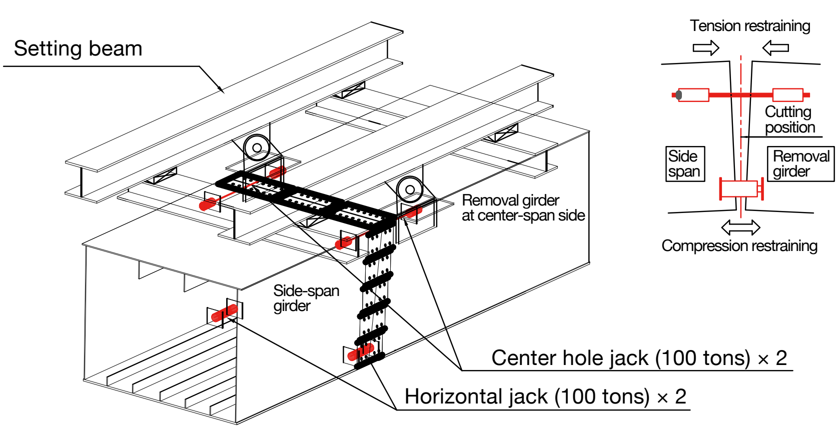


Photo 2 Upper: Girder replacing condition
Lower: Girder removal and transport

Photo 3 Full view after bridge rebuilding on Yaesu Route

of the girder (Fig. 5). The nighttime removal work was completed within the specified limit placed on traffic closures by capitalizing on advance simulations and the provision of risk management countermeasures, and by reliable removal procedures.

Successful and Rapid Rebuilding of Bridge Girders

After removal of the existing bridge girders, the partial rebuilding of the Yaesu Route was completed 3 months earlier than the original schedule, largely due to the adoption of a large block erection method using transporters and to other new approaches applicable to construction cranes and temporary equipment (Photo 3).

Countermeasures against the superannuation of urban infrastructure are a pressing task. We will be glad if the rebuilding technologies introduced above might serve as a reference in future large-scale bridge renewal projects that are expected to grow in number. ■

Message from New JSSC President

Yozo Fujino, President, Japanese Society of Steel Construction

I assumed the post of President of the Japanese Society of Steel Construction (JSSC) in June 2014.

JSSC was established in 1965 as an interdisciplinary organization that includes makers of steel and construction materials, construction companies, fabricators, consulting companies and academia. JSSC celebrates its 50th anniversary in 2015.

My primary task is to guide the enhancement and expansion of JSSC's international activities and, secondarily, to promote the transmission of Japan's advanced steel construction technologies with the aim of creating secure and reliable societies worldwide. A typical example of our tasks is the active involvement in the establishment of common international standards such as those of the International Organization for Standardization (ISO) in order to promote the worldwide spread and development of steel construction from a global perspective.

In May 2015, IABSE (International Association for Bridge and Structural Engineering) will hold IABSE Conference Nara 2015 in Japan. As a member of the JSSC secretariat responsible for the conference, I will extend active support and cooperation.

To these ends, I will make the utmost effort to nurture young researchers and engineers regardless of national origin so as to reinforce technological foundations related to steel construction.

Taking the occasion of JSSC's 50th anniversary and capitalizing on the Society's many achievements, I am preparing myself to tackle these tasks one by one. Lastly, I would like to ask for your continuous support and understanding of JSSC operations.

Profile

1972: Graduated from Faculty of Engineering, University of Tokyo
1976: Ph. D (Civil Engineering), University of Waterloo
1990: Professor, School of Engineering, University of Tokyo
2014: Distinguished Professor, Institute of Advance Science, Yokohama National University; Professor Emeritus, University of Tokyo

Major Awards

- Medal with Purple Ribbon, Cabinet Office, Government of Japan
- Scanlan Medal, American Society of Civil Engineers (ASCE)
- T.Y. Lin Medal, International Conference on Bridge Maintenance And Safety
- Nishino Medal, East Asia-Pacific Conference of Structural Engineering and Construction
- George Winter Award, ASCE

IABSE Conference Nara 2015

IABSE (International Association for Bridge and Structural Engineering) will hold IABSE Conference Nara 2015 for three days from May 13 to 15, 2015 in Nara, Japan. The main theme of the conference is "Elegance in Structures." This conference will target elegant solutions and structures that demonstrate structural resistance to earthquakes and wind—including modeling and analysis methods for these structures, in addition to conventional structural forms.

A variety of events are planned for each day of the conference: delivery of keynote lectures, presentations of technical papers, commercial exhibitions, technical visits and other activities.

Taking this opportunity, all companies and organizations working in steel construction are cordially invited to participate in the conference.

IABSE Conference Nara 2015

• Venue

Nara Prefectural New Public Hall: Noh Theater, Conference Room, Reception Hall & Gallery
URL:http://www.shinkokaido.jp/welcome/

• Exhibit application and expense

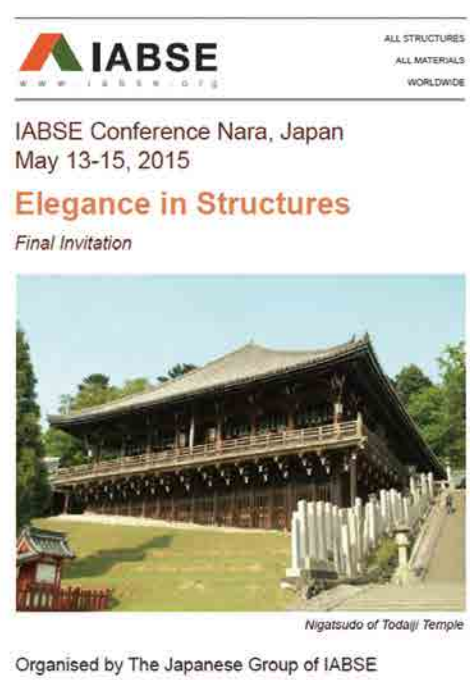
Access to IABSE website (URL: http://www.iabse.org/)

Major Events: Keynote Lectures

- Mike Schlaich (Technische Universität Berlin, Germany)
- Ian Firth (Flint & Neill, COWI, UK)
- Kaori Fujita (the University of Tokyo, Japan)
- Joseph Tortorella (Robert Silman Associates, USA)
- Sun Limin (Tongji University, China)
- Akio Kasuga (Sumitomo Mitsui Construction Co., Ltd., Japan)
- Masao Saito (Nihon University, Japan)
- Ryoichi Kanno (Nippon Steel & Sumitomo Metal Corporation, Japan)
- Woo-Jong Kim (DM Engineering Co., Ltd., Korea)

Young Engineers Program

A workshop Elegance in Structures will be held at the conference venue on May 12 afternoon. It is basically a design competition for a pedestrian bridge in Nara: the workshop includes lectures by prominent engineers, review of designs proposed by young engineers (35 years old or younger) and an award ceremony.



JSSC Symposium 2014 on Structural Steel Construction

JSSC Symposium 2014 on Structural Steel Construction, sponsored by the Japanese Society of Steel Construction, was held on November 13 and 14, 2014 in Tokyo and served as a useful venue for researchers including graduate students, engineers of steelmakers and steel users, JSSC members and others working in steel construction.

A variety of events were held, centering around the Academy Session where theses lectures were given by contributors to the JSSC annual journal *Steel Construction Engineering* and the Memorial Lecture Meeting where the winners of JSSC commendations for outstanding achievement in 2014 made presentations (for the prize-winning works, refer to pages 1~6). Also featured were lecture meetings and panel discussions that aimed to comprehensively and functionally link the activities of JSSC's various committees—Stainless Steel Session: presentation titled "Outline of Dual-phase Stainless Steel and Corresponding Applications;" Engineering Session: presentation titled "From the Age of Construction to the Age of Utilization—Urban Renewal and Steel Structures;" and International Session: presentation titled "Tackling Globalization."

Prize winners of JSSC commendations for outstanding achievements in 2014

Message from New Chairman of International Committee

Kuniei Nogami, Chairman, International Committee (Professor, Tokyo Metropolitan University)

I have assumed the post of Chairman of the International Committee of the Japanese Society of Steel Construction (JSSC).

Starting with issue No. 26 of *Steel Construction Today & Tomorrow*, published in 2009, our International Committee has been responsible for the editorial planning of one of the three issues that are published annually. Since its inauguration, JSSC has conducted wide-ranging activities in the form of surveys, research and technological development aimed at promoting the spread of steel construction and at improving associated technologies, and at the same time it has extended cooperation to related organizations overseas.

Following the merger of JSSC with the Stainless Steel Building Association of Japan in 2010, JSSC's field of operation expanded to include not only carbon steel but also highly corrosion-resistant stainless steel. Consequently, we intend to actively transmit information throughout the world that is related to a wider range of steel construction areas.

As was true in issue No. 41, the previous special issue of the JSSC for which our committee was responsible, our current issue, No. 44, introduces the excellent works and theses that have received a JSSC prize of commendation for outstanding achievement in 2014. In addition, this issue features "demolition methods for steel structures," particularly a demolition method for high-rise buildings and steel bridges. It also reports on the 2013 JSSC Symposium on Structural Steel Construction and other major operations.

The International Committee, while working on multi-faceted responses to the internationalization of steel construction specifications and standards, promotes exchanges of technical information and personnel between Japan and overseas organizations. As one aspect of these operations, we are attempting with this issue to inform our readers of JSSC operations, trends in steel construction, and the technologies and technological developments relevant to the planning, design, and building of steel structures in Japan.

If you wish to obtain more detailed information about the various articles contained in this issue or to receive related technical information, please do not hesitate to contact the JSSC secretariat (info-jssc@jssc.or.jp).

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