

## –Features– Interdepartmental Collaboration

# “To Make the Best Proposal for Our Customers”

### Civil Engineering Business Unit



General Manager, Head of Civil Engineering Planning Division  
**Satoshi Taguchi**

#### ■ Collaboration with the Building Construction Business Unit in Coastal Areas

The coastal areas are the very best place to take an advantage of collaboration with Building Construction Business Unit for building projects along shorelines in that our expertise such as assessment of the inundation height and soundness of existing seawall by tsunami and storm surge simulations can be actively used. AR\*<sup>2</sup> and VR\*<sup>3</sup> technologies can also be utilized effectively. We will further promote the “productivity improvement” through the collaboration with Building Construction Business Unit, including construction aspect such as to closely share information on subcontractors.

#### ■ Promotion of Technology Exchange with International Business Unit

We consider that the improvement of productivity by promoting i-Construction\*<sup>4</sup> is the common challenge in both Japan and overseas. To achieve this target, we have to expedite our technological and personnel collaboration. An existing technology which is no longer used in Japan could potentially a technology which may contribute to improve a productivity when used in different circumstances in overseas. Also, we believe that facilities maintenance technology in Japan would be demanded overseas in near future. We will improve productivity both in Japan and overseas by properly capturing the “needs” for both parties through collaboration meetings and mutual utilization of technologies to satisfy such “needs”.

#### ■ Steady Implementation of Work Style Reform

Cooperation with the back-office is essential to ensure the steady implementation of work style reform. Work-Life-Balance shall also be considered simultaneously. We will move forward the work style reform further and the securing of workforce through understanding each other what we should do and based on mutual information sharing.

\*<sup>2</sup> Abbreviation for Augmented Reality.

\*<sup>3</sup> Abbreviation for Virtual Reality.

\*<sup>4</sup> i-construction Activities advocated by the Ministry of Land, Infrastructure and Transport to improve the productivity of the entire construction and manufacturing system with the goal of creating an attractive construction site by introducing ICT (Information and Communication Technology) in all business processes, including measurement, design, construction, inspection, maintenance, and management. These activities consist of overall utilization of ICT (as in ICT earthworks), standardization of specifications (as in concrete construction), and leveling the number of concurrent construction projects over a specific amount of time.



# Interdep Collab



### International Business Unit

#### ■ Utilize Domestic Technical Capabilities to Overseas

We have been awarded the port of coal-fired power plant in Bangladesh which is the largest-ever project in our company, and several other large projects in Singapore with high appreciation to our technical proposals which properly addressed customers concerns. These are the achievement of highly competitive technical proposals made through collaboration with Civil Engineering Business Unit by mobilizing expert opinions from various fields. International Business Unit has full knowledge of each country situation and excellent capability for project operation while Civil Engineering Business Unit has strong technical capabilities. Collaboration of these Units will surely create great synergy effects. We will strive to provide “better services” further through this collaboration between the Units.

#### ■ Safety Management in Collaboration with Domestic Departments

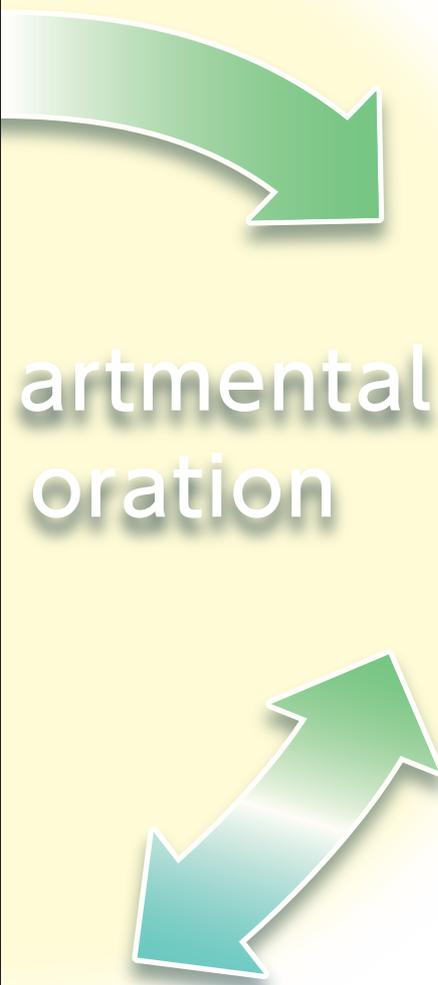
Some countries maintain a level of safety awareness as high as Japan, while some do not. The top-level policy of international Business Unit states that no safety compromise shall be made regardless of the level of safety standard in each country. As a first step, we shall enhance the safety mindsets of local employees who are directly involved in safety management. In addition, we will dispatch overseas employees to domestic project sites so that they will become familiar with the domestic safety standards. Also, we will regularly carry out joint safety patrols that include domestic safety personnel to maintain a high level of safety awareness.



General Manager, Head of Design and Engineering Division, International Civil Engineering Divisions Group  
**Hidetsugu Matsumoto**

Looking ahead to FY3/22, the 125th anniversary of our company's foundation, we will continue to focus on core business to mastering the contracting business\*1 as a general contractor whose strengths lie in coastal areas and overseas. "Interdepartmental collaboration," which we are currently promoting, means that in order to improve the level of professionalism in our construction, each department independently conducting business, collaborates with other departments, leading to maximum synergy. When high technical capabilities are demanded, we believe that "mastering the contracting business" really means how we can make proposals one step ahead for the customer. We will promote interdepartmental collaboration to improve our technical capabilities.

\*1 "Mastering the contracting business": As a professional contractor, placing ourselves in our customers' or end-users' positions in order to provide integrated services from planning and designing stages through construction and after-maintenance



## Building Construction Business Unit

### ■ Interdepartmental Collaboration Leveraging on the Expertise of Each Department

Interdepartmental collaboration leveraging the expertise and experience of each department leads to productivity improvement as well as mastering the contracting business.

In the large-scale underground construction work of Yodobashi-Umeda Integrated Development, we solved technical issues by collaborating with our civil engineering departments who have the expertise and experience. Also, during the construction of a hospital in Singapore, we collaborated with the Institute of Technology for construction methods and adoption of high-strength concrete.

With the aid of highly skilled international departments, we aim to expand the utilization of BIM\*5/CIM\*6 in the domestic departments.

### ■ Sharing of Information and Promotion of its Utilization

It is necessary to share and utilize the technical information of each department in order to enhance interdepartmental collaboration and improve technical and on-site capabilities.

Building construction departments are working on the development of automated technology in construction while using the technical information developed and shared by civil engineering departments. In addition, the international departments share information on prefabrication technology while the domestic departments share information on the refrigerated warehouse technology. Through this collaboration, it becomes easy to utilize various information for construction. Furthermore, we make company-wide labor-saving efforts on site by holding joint briefing sessions on labor-saving technologies and by sharing information among departments.

We will continue to enhance interdepartmental collaboration leveraging on the expertise and experience of each department.



Executive Officer, Executive of Building Construction Business Unit (Construction Engineering)

**Nario Yoshida**

\*5 Abbreviation for Building Information Modeling/Management. It is used to improve and enhance the efficiency of operations by introducing and utilizing 3D models in a series of cycles from planning, investigation and design through construction and maintenance management in the field of building construction.

\*6 Abbreviation for Construction Information Modeling/Management. In the field of civil engineering, CIM is synonymous with BIM.

### ■ Serve as a Point of Contact for Domestic/International Collaboration

In FY3/19 we established the Design and Engineering Division in International Building Construction Divisions Group and set up a BIM/CIM Promotion Group at the same time. The major roles of the Design and Engineering Division are to provide technical support to each country and to serve as a point of contact for domestic/international collaboration. Through performing these roles, the collaboration group conducts collaboration work with domestic departments while sharing and developing technical information in parallel. The establishment of the contact point allows us to promote further information sharing, propose and execute the best resolution for challenges and risks by overcoming barriers between departments. In addition, it aims to improve the company-wide technology and productivity in construction.

### ■ Interdepartmental Collaboration of Design, Construction and BIM/CIM

The workflow of interdepartmental collaboration has been gradually established such as design review conducted by domestic designers for design and build projects of international departments and mass concrete analysis by the Institute of Technology. We will provide information from international departments on new construction technologies such as an advanced prefabrication technology and the use of structural timber, and share such information with domestic departments.

The BIM/CIM Promotion Group will make information sharing easier by playing a leading role in facilitating collaboration among international departments, construction departments and civil engineering departments. Promoting BIM/CIM utilization in domestic/international civil engineering and construction projects will contribute to work style reform and improvements in quality and productivity.



Senior General Manager and General Manager, Head of Design and Engineering Division, International Building Construction Divisions Group

**Nariaki Ihara**

## –Features– Interdepartmental Collaboration

# “To Make the Best Proposal for Our Customers”

## Collaboration with Civil Engineering Departments in Yodobashi-Umeda Integrated Development

### ■ Collaboration between Building Construction and Civil Engineering Departments on site

We were awarded this project as the performance of our civil engineering department was highly regarded in the industry.



<Building Construction Business Unit>  
Deputy Head of Osaka Branch and  
Project Director of Yodobashi-Umeda  
Integrated Development Site Office,  
Osaka Branch

#### Hiroyuki Ando

The building is located in one of the most important commercial districts in Japan, right in front of JR Osaka Station. It will be a commercial complex that consists of a hotel and retail spaces. It has 35 floors aboveground and 4 floors underground. With a height of 150 m and a total floor area of 110,000 m<sup>2</sup>, it is one of our largest Japan building projects. We will complete the construction in a short work period, approximately 27 months.

This project is a challenge and a great opportunity to us. We have to make company-wide efforts to complete the construction without fail. The challenges we face for this project include construction in soft clay, high groundwater level and close proximity to the subway. An inverted construction method\*1 is used for underground construction, which minimizes impact on the adjacent subway. It is a battle against the “ground” as well as the “construction size.”

To complete the construction, we must gather the capabilities of building construction departments and collaborate with civil engineering departments. At the site, building and civil engineering employees work together in order to make progress on the challenging construction work.

\*1 Inverted construction method

Construction method used to build a concrete structure that has underground floors. Contrary to the normal construction method, this method begins with construction of the 1st floor, and then sequentially advances the construction of lower floors. This advances the construction of underground floors simultaneously with aboveground floors.



Yodobashi-Umeda Integrated Development computer generated image

## Civil Engineering and Building Construction Collaboration

### ■ Construction Collaboration Overcoming the Barriers Between Building Construction and Civil Engineering

In the heart of the downtown area, it took us approximately 6 out of the 27 month construction period to complete SMW\*2 and pile installation. In the remaining 21 months, we have to complete a 20m deep excavation of approximately 127,000m<sup>3</sup>, which forms the framework of 4 floors of basement to be constructed by the inverted construction method; the connection with the existing building both aboveground and underground; the construction of steel beams up to a height of 150m aboveground; and PC construction. We are collaborating with civil engineering departments in order to proceed with the construction. We are working closely with them to manage construction while monitoring subway operations by providing automatic monitoring of subway tracks and earth retaining structures movement, as well as pressurized groundwater levels. We are also working together to study earth retaining structures and 3D analysis of mass concrete. It is encouraging to get the technical support from civil engineering departments and we really feel the positive effect of collaboration.

When we abandon the idea of relying on specialists, tap on the strengths of each department, and share information for our collaboration, we will be a company whose strength is “high technical capability”, without barriers between building construction and civil engineering.

\*2 Abbreviation for Soil Mixing Wall.  
This is an earth retaining wall created by mixing soil and cement slurry in situ.

<Building Construction Business Unit>  
Senior Project Manager of Yodobashi-Umeda  
Integrated Development Site Office, Osaka Branch

#### Takuro Haneda



### ■ Construction Collaboration by Taking Advantage of Our Specialty

The role of civil engineering department in this project is to minimize the impact of construction on the neighborhood area such as adjacent major roads, subway and existing Yodobashi-Umeda building while performing large-scale underground construction in the center of a metropolitan area.

As a measure to the high groundwater level and cohesive soil ground with a high moisture ratio, we implemented a ground improvement method, aiming to control the groundwater levels and dehydration of cohesive soil during pile construction and excavation. Considering the impact on the subway track, we designed earth retaining walls and managed various measurements for the excavation work. Through these measures we are able to minimize the impact on the subway track. Through collaboration with the building construction departments, we coordinate the schedule and make construction adjustments aboveground and belowground for processes like loading and unloading materials and equipment, along with positioning heavy equipment used in the inverted construction method. Collaboration and information sharing are carried out every day in order to ensure that construction is performed smoothly.

<Civil Engineering Business Unit>  
Project Manager of Yodobashi-Umeda Integrated  
Development Site Office, Osaka Branch

#### Kazuto Hata



## Interdepartmental Collaboration Utilizing BIM/CIM



Sengkang Integrated Hospital

### ■ Newly Established BIM/CIM Promotion Group

In FY3/19, we organized the BIM/CIM Promotion Group consisting of 10 members from the Design and Engineering Division, International Building Construction Divisions Group, International Business Unit to start interdepartmental collaboration using BIM/CIM.

For the first year, 40 cases of BIM collaboration and 12 cases of CIM collaboration are planned. In response to the request from the building construction and civil engineering departments, our “BIM/CIM Promotion Group” in the International Business Unit will produce these BIM/CIM models that can be effectively utilized by setting the model's level of detail according to the three objectives: sales assistance, design assistance, and construction assistance. We will also work on the establishment of the Penta-Ocean BIM/CIM Standard by sharing BIM objects and model data we have obtained from the collaboration.

We believe that promoting interdepartmental collaboration by utilizing BIM/CIM will lead to energy savings and improved productivity, in addition to further improving quality and technical capabilities. It will be an important process for mastering the contracting business through sales, design, construction and facility management.



<International Business Unit>  
Senior Manager of Design and Engineering Division, International Building Construction Divisions Group

**Kenji Matsumura**

## Civil Engineering, Building Construction and International Collaboration

### ■ From BIM Utilization to CIM Utilization

In 2014, we introduced CIM for the first time in the Transmission Cable Tunnel construction project connecting Jurong Island and the main island, leveraging our BIM experience from the Changi General Hospital project in Singapore.

We established the collaboration procedure for the BIM/CIM model and also worked on geotechnical modelling. In the T211 subway construction project, we voluntarily utilized BIM/CIM that was not required in the contract, and performed interference checks and adjustments for MEP services before we started the construction. Additionally, due to unforeseen poor ground conditions during pile construction at the station, grout injection was required. We utilized the geotechnical model in our explanation to the client. We are capable of making better judgement not only during construction but also during tender. In 2017, utilizing CIM for excavation volume and rock condition analysis assisted us in developing good proposals for tender. As a result, we were awarded the following projects: Earthworks and Piling Works for Woodlands Health Campus; and Deep Tunnel Sewerage System Contract T-08.

We will extend CIM utilization both domestically and internationally in collaboration with CIM team in Japan in the future.



<International Business Unit>  
BIM Manager of Design and Engineering Division, International Building Construction Divisions Group

**Michelle Lee**

### ■ Supporting Domestic BIM Expansion by International Departments

Regarding interdepartmental collaboration of the BIM/CIM Promotion Group, we have already produced BIM models for 16 cases of domestic construction projects and are trying to utilize BIM in each construction process, such as proposing a construction plan during tender, considering construction cycles using PCa\*<sup>3</sup> during construction, and considering detailed settlement of the building under construction. The BIM/CIM Promotion Group produces several BIM models for the buildings in Japan with different sizes for different applications, leading to the improvement of model accuracy, accumulation of data, and establishment of the Penta-Ocean BIM Standard. We share information with domestic departments through BIM models, and we are able to know the domestic on-site situation while working overseas. This is the effect of our collaboration. It is also a good opportunity for overseas staff to learn about domestic construction methods.

\*3 Abbreviation for Precast Concrete. It refers to concrete members manufactured at a factory and assembled at a construction site.



<International Business Unit>  
BIM Assistant Manager of Design and Engineering Division, International Building Construction Divisions Group

**Kyo Fujioka**

## –Features– Interdepartmental Collaboration

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## Matarbari Ultra Super Critical Coal-Fired Power Project Package 1.2(Port Works) ,



<Institute of Technology>  
Deputy Head of Institute of Technology

**Masahito Tsuru**

### ■The True Value of Interdepartmental Collaboration

Interdepartmental collaboration had shown its true value for being awarded the project. During the tender, we collected and analyzed satellite photos, wave data, bathymetric survey data, etc. of the planned construction site and found a critical concern on a probable heavy sedimentation within the access channel by that the port may not be functioned. Thus we, the Institute of Technology, teamed up together with the Design and Engineering Division to study preventive measures against the sedimentation. As a result, we proposed a sediment mitigation dyke and it was accepted by the client as a countermeasure and contributed to be awarded. After awarded, we continue to work on the sedimentation prediction, the detailed design of sediment mitigation dyke and the construction planning in collaboration with the project team, International Civil Engineering Divisions Group, Civil Engineering Divisions Group, and Institute of Technology.

### ■The First Step is Changing Our Thinking

Through this effort, we could successfully build a better relationship with the employees of International Business Unit, which helped us improve our communication and created a culture of openness.

The first step for interdepartmental collaboration is to adopt thinking along the lines of “finding the potential values within the company,” without sticking to a small framework such as the organization and team we belong to.

## Institute of Technology and International Collaboration

### ■Tender Support through Interdepartmental Collaboration

In the interdepartmental collaboration for obtaining this project, we were required to simulate and predict the amount of sedimentation within the access channel during the construction and in future. The site is a severe littoral transport environment where several critical factors, such as the wave, tide, sand, silt, etc. needs to be considered, for which a high-level analysis technology was required. It was a difficult task to obtain reliable data, but it was accomplished by the project office. By using such data, we could successfully improve the model accuracy and propose effective measures against sedimentation within the access channel. This proposal led us to win the project, and now we are often consulted for similar simulations for other projects.

We will further enhance interdepartmental collaboration both in Japan and overseas so that we can demonstrate the capabilities of our entire company.



<Institute of Technology>  
Senior Manager of Civil  
Engineering R&D Division

**Hiroshi Sanuki**

### ■Collaboration during Tender to Take Advantage of Technical Capabilities

During tender for this project, we could receive a cooperation of the Design and Engineering Division and Institute of Technology to make a plan and proposal. Since we considered that the original measures against sedimentation within the access channel would be insufficient, we collaborated with other departments for presentation of proposed measures to the client. By doing the above, we could submit the tender reflecting additional measures to the sedimentation in our technical proposals.

Furthermore, the proposed measure was the key issue in the tender evaluation and contract negotiation. As such, mobilizing domestic know-how and high technical capability throughout the tender period was resulted in successful award of the project. Now, at the construction stage, we continue technical collaboration for sedimentation prediction, monitoring, construction methods, etc.

I will implement the project successfully by continuing the close collaboration with domestic departments, international departments, and the project team.



<International Business Unit>  
Project Manager of Matarbari Ultra  
Super Critical Coal-Fired Power  
Project Package 1.2(Port Works)  
Site Office

**Keisaku Takae**

## Bangladesh

### ■ Collaboration with Domestic Departments regarding the Contract

For this construction project, before finalizing the contract, we collaborated with the domestic civil engineering department to review the conditions and costs for technical proposals, discuss how to incorporate such matters in the terms of the contract, and make our proposal. Through many consultations with the client, we were able to create a contract that was appealing to both parties. And even after signing the contract, we periodically collaborate with the concerned site, domestic and international parties to continue risk analysis, management and complaint handling.

The Contracts Management Division is making efforts every day to minimize the risk of our business. Through clarification and analysis during collaboration among tender personnel, construction personnel, and departments in Headquarters, we were able to come up with measures and management methods regarding a wide variety of contractual risks. These risks may occur in the processes of tender, contract, construction and completion of overseas projects.

By enhancing our contract management method for overseas projects, we will contribute to strengthening and further developing our overseas business.

### ■ Collaboration with the Contract Management Division

We are supporting the Contract Management Division by handling contract management, and tender support services for overseas construction. As well as supporting Contract Management Division. We perform a variety of functions including closely examining the terms and conditions of the tender; distributing the tender information; preparing tender submissions; responding to tender queries; preparing contract documents; and handing over contract documents to the relevant parties for construction.

For this project that we were awarded last year, we were able to successfully enter into the contract by collaborating with the Contract Management Division the members of the domestic civil engineering department discussion team, as well as the person in charge of tender in the Civil Engineering Division, International Business Unit.



<International Business Unit>  
Executive General Manager,  
Deputy Head of International  
Building Construction  
Divisions Group and General  
Manager, Head of Contract  
Management Division,  
International Civil  
Engineering Divisions Group  
and International Building  
Construction Divisions Group

**Desmond Hill**



<International Business Unit>  
Senior Manager of Civil  
Engineering Division,  
International Civil  
Engineering Divisions Group  
and Building Construction  
Division, International  
Building Construction  
Divisions Group

**Poh Lay Yen**



CASSIOPEIA V dredging in this project