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## Civil Engineering Business

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### Business Characteristics and Strengths

Our civil engineering business provides optimum design and execution technologies for new construction and maintenance of civil engineering structures that support social infrastructure, such as bridges, tunnels, railways and water and sewage facilities, all of which are indispensable to urban life. Our strength lies in having the industry's top experience in design and execution in prestressed concrete (PC) bridges. We provide high quality, durable and easy-to-maintain bridges by promoting technological development, including new structural forms or precasting for shorter construction periods and labor-saving execution. We are also developing social infrastructure using technologies and expertise supported by our wealth of experience in wide-ranging areas, including tunnels, dams, urban civil engineering, rivers, land development, and energy facilities. Moreover, we are increasing our share in a large-scale renovation project on an expressway, including PC floor slab replacement and tunnel repair.

## Opportunities and Risks as well as Basic Policies of the Medium-term Management Plan 2019–2021 as Countermeasures

### Opportunities

- Expansion of the infrastructure improvement market in emerging nations
- Increase of projects related to prevention and mitigation of damage caused by natural disasters in line with the reinforcement of national territory
- Expansion of the infrastructure maintenance and renovation market along with the increase in deteriorating infrastructure
- Expansion of renewable energy markets associated with promoting carbon neutrality policies

### Risks

- Response to the reduction of overtime work
- Shortage of human resources among mid-level employees
- Decline in the new infrastructure market
- Changing credit to new private customers due to the COVID-19 crisis
- Stagnation of overseas construction due to the COVID-19 crisis

### Basic Policies of the Medium-term Management Plan 2019–2021 as Countermeasures

1. Stepping up efforts for productivity improvement and achieving work style reforms
2. Cultivating human resources early on and accelerating shift to overseas
3. Securing domestic share and enhancing international competitiveness
4. Establishing advantage in the infrastructure maintenance and renewable market
5. Making group-wide efforts for improving integrated capability and for business peripheral to construction and new business

## Our Perception of Business Environment

We expect public works investments to move slightly upward in the civil engineering. In the domestic construction market, orders increase for largely renovating aging expressways, introducing four-lane and six-lane expressways, and building seawalls and river embankments with the policy effect based on Five-year Acceleration Measures for Disaster Prevention and Mitigation and National Resilience. Also, expecting large-scale civil engineering projects overseas, such as ODA, we continue to see them as growth markets. Conversely, we need to assess and respond to the situation. There are uncertain factors, especially in domestic private-sector capital investment, because nobody knows when the COVID-19 crisis ends. We also forecast increasing demand for renewable energy projects as a result of accelerating the global efforts to achieve carbon neutrality by 2050. Focusing on technological trends in storing hydrogen and ammonia, we recognize this market has potential for growth in the future.

## Results and Major Efforts in Fiscal 2020

We started fiscal 2020, the second year of the Medium-term Management Plan, with a target of 120.0 billion yen in total given the impact of the COVID-19 crisis. This target consists of 100 billion yen in Japan and 20 billion yen overseas. Orders received were domestic 109.2 billion yen and overseas 21.4 billion yen, totaling 130.6 billion yen and exceeding our target of 120.0 billion yen. Amount of completed work was 128.1 billion yen, greatly exceeding our target of 110.0 billion yen, driven by favorable progress with many domestic projects in hand. Gross profit of completed work was 13.2 billion yen.

Orders were postponed for some projects, and the period for applying for bidding was extended in the domestic civil engineering market due to the spread of COVID-19; however, they caused no significant impact. We successfully received a wide range of orders, including large-scale renovation projects centered on expressway companies, tunnel works ordered from the Ministry of Land, Infrastructure, Transport and Tourism, substructure construction, large-scale bridge construction on the Chuo Shinkansen, and tunnel lining and reinforcing works. Additionally, we are continuing our efforts in the renewable energy-related field, such as solar power generation and biomass power generation.

## Development of technologies

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In developing technologies, we focused our energy on efforts to reduce manpower and raise production by applying developed technologies, including the real-time automatic system to inspect complete reinforcing bar shapes “Raku Camera™,” remote inspection system “Enken™,” and SMC Tunneling series “Automatic de Lining” for application in tunnel work. We also concentrated our efforts to develop the technologies for the large-scale renovation projects, releasing development of the PCa floor slab construction machine.

▶ [Technological Strategy](#)

## Fiscal 2021 Policies

Orders for domestic public works projects are expected to remain at the same level as usual, and large-scale ODA projects are also planned overseas. On the other hand, private-sector projects are expected to decline due to the impact of COVID-19. In this market environment, our maximum priority by the end of the COVID-19 crisis is to protect the lives and livelihoods of not only the Company's employees, but also those of the workers of partner companies at sites, their families, and all concerned. We have set strict rules as measures to prevent infection, and are continuing our production activities with everyone following these rules and no suspension of operations at sites. In fiscal 2021, we will work on the following two points as our "response to changes" for the future.

### Efforts for digital transformation (DX)

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The first is "to optimize our business through advancing ICT utilization." We establish BIM/CIM Promotion Group to strengthen our response to works using BIM/CIM in projects under the control of the Ministry of Land, Infrastructure, Transport and Tourism and increase design productivity through 3D utilization. We will emphasize on creating and developing more technologies that can meet the productivity improvement required for technical proposals at the time of bidding. We will also stick to the results of implementation and effectiveness at sites and strengthen our competitive advantage. Specifically, we will work on producing PC floor slabs using Robotaras<sup>TM</sup> and upgrading automated design system for floor slabs (SMC-Slab) at the Notogawa Factory.

### Initiatives for sustainability transformation (SX)

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The second is "to implement measures to CO<sub>2</sub> emission reduction throughout the entire supply chain." Expanding Scope, the framework for reporting emissions based on GHG Protocol, we establish a prompt calculation system of CO<sub>2</sub> emission and address cost comparison through CO<sub>2</sub> pricing, aiming at early development of superior environment-friendly technologies. Promoting an adoption of RE100 at sites, we will also work to reduce CO<sub>2</sub> emissions by considering the introduction of green power procurement and in-house power generation facilities at site offices. In addition, as civil engineering, we contribute to SX by strengthening sales and expanding customers in the renewable energy field (onshore wind, offshore wind, solar, biomass, small hydropower, geothermal heat, and the similar).

## Initiatives for enhancing competitive advantage

### Develop a machine to reduce labor and improve safety in floor slab replacement works —Development and future vision of floor slab construction machines—

We developed the floor slab construction machine, enabling efficient execution of construction in the floor slab replacement works of a bridge, under special conditions that no common cranes can carry out the work. We applied this machine for the first time to the execution of construction directly under high-voltage lines in the floor slab replacement work on Tomei Expressway (between Susono Exit and Numazu Exit) and were able to obtain the following effects.

- It can proceed with the execution of construction at a maximum machinery height of eight meters. (The separation distance between high-voltage lines and the worksite is approximately 12 meters.)
- We can remotely operate the series of works from removing the existing floor slabs to constructing new ones, which increases safety.
- Lowering the height of the machinery to 4.5 meters when pausing the work reduced an impact on adjacent service lines.

We will continue to develop the machinery to increase productivity further, looking ahead to future automated construction. We will continue to improve the machinery to become the main machinery for the floor slab replacement works, aiming to speed up the execution of construction beyond the common cranes despite the particular conditions.

- ▶ [Release: “Develop and Apply a New Floor Slab Construction Machine to Reduce Labor and Manpower in Floor Slab Replacement Works” \(December 24, 2020\) \(Japanese only\)](#) 



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Floor slab replacement work on Tomei Expressway (between Susono Exit and Numazu Exit)