

# Foundations Supporting Strength and Growth

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# Technologies

Kajima strives to be an industry leader in construction technologies. Having established a reputation in railways, dams, skyscrapers and seismic damping, we have expanded our business domains to meet the needs of the times. We will continue to lead the way in developing essential technologies with the enterprising spirit that we have passed on since our establishment to satisfy customer needs and carve a path into a new era.

## R&D Strategy in the Medium-Term Business Plan

Drastically improve productivity <b>Human and machine collaboration</b>	Address social issues and customer needs <b>Trailblazing R&amp;D</b>	Strengthen R&D platform <b>Human resources + Capital + External resources</b>
<b>Smart production, turn construction site into automated factory</b> <ul style="list-style-type: none"> <li>Reduce the number of workers and automate by using machines, robots and ICT</li> <li>Promote technological development by leveraging BIM/CIM</li> </ul>	<ul style="list-style-type: none"> <li>Large-scale urban development</li> <li>Maintenance and management/Lifecycle engineering</li> <li>Environment/Energy</li> <li>Disaster prevention and mitigation/BCP</li> <li>Better performance and higher added value</li> </ul>	<ul style="list-style-type: none"> <li>Priority investment in key themes</li> <li>Promote Group collaboration</li> <li>Explore and introduce innovative technologies/ideas</li> <li>Utilize external resources</li> </ul>



FY2018 ¥ **15** billion

Cumulative for Plan Period ¥ **50** billion

## Recent Track Record in Developing Key Technologies

<b>Seismic damping</b>	Container Damper System (CDS) seismic-damping system for warehouses with automated rack systems
<b>Seismic damping</b>	D <sup>2</sup> SKY <sup>®</sup> -RC major earthquake-responsive TMD* for reinforced concrete structures
<b>Seismic damping</b>	D <sup>2</sup> SKY <sup>®</sup> -c compact, low-cost TMD for medium- and low-rise buildings
<b>Productivity</b>	KENLOGI and K-Field systems for improving the efficiency of materials and equipment management/operation
<b>Productivity</b>	Hybrid fire-resistant coating method that efficiently utilizes two types of fire-resistant coating
<b>Productivity</b>	Cut and Crush Method <sup>®</sup> for instantaneous pile-head concrete crushing and removal
<b>Productivity</b>	New Kote-King concrete finishing robot

\* TMD: Tuned Mass Damper

## Seeking Out and Introducing Cutting-Edge Technologies in Japan and Overseas

Looking to generate R&D outcomes that will transform its business going forward, Kajima will consider alliances and M&As with companies and research institutions in Japan and overseas, including small and medium-sized enterprises and venture firms, to create construction technologies that incorporate AI, IoT, robotics and other cutting-edge/innovative technologies and ideas.

In September 2018, we opened a business location in Silicon Valley in the United States. Technical staff have been stationed in the Silicon Valley Office of WiL KK (Head Office: Minato-ku, Tokyo), which invests in venture companies and other businesses, to help us pursue open innovation that integrates the technologies of venture companies with our own. We will seek out venture companies possessing new technologies that improve productivity and match them with development groups within the Company to accelerate commercialization of these technologies.

## Research and Technology Development Underpinning Kajima's Creativity

Tapping into the enterprising spirit it has passed down, Kajima has developed many technologies to meet the demands of the times. For example, we have consistently led Japan and the rest of the world in seismic damping and seismic isolation technologies, including Japan's first oil damper for construction use that we developed in 1995. We have established high-performance seismic damping and seismic isolation technologies, including the latest HiDAX-R® oil damper and the D<sup>3</sup>SKY® super-large TMD for seismic damping in skyscrapers. However, the development of disaster prevention technologies does not stop here. Combining elemental technologies and incorporating big data will enable the development of even more sophisticated technologies.

More specifically, a high-sensitivity seismic observation network covering all of Japan has been established and surface surveillance via satellite has become possible, giving rise to expectations that these high-precision data will be disseminated via public institutions. We will work to build a more effective disaster-prevention system by accessing these data in real time and by utilizing AI and IoT.

Employing big data will also be a key factor in accelerating technological development. For instance, in addition to the environmental/energy performance enhancements we have developed for buildings thus far, we would like to make use of biometric data measured with wearable terminals to provide users with safer and more secure and comfortable living environments. In ways such as these, we intend to bring about a more prosperous and sustainable society.

To achieve this goal, it is essential that we as an organization are flexible enough to make the best use of human resources with a broad range of specialties. We are committed to pursuing the development of technology that will serve as a foundation for Kajima's creativity by conducting personnel exchanges among research institutes, design departments and construction sites, and by investigating cutting-edge technologies and engaging in technology marketing through open innovation.



**Kazuo Kojima**

Executive Vice President  
Responsible for Research and  
Technology Development

## Highlight

### Kajima Technical Research Institute Celebrates Its 70th Anniversary

Kajima Technical Research Institute (KaTRI) was established in 1949 based on the philosophy of then Company president Morinosuke Kajima that "constant research and creativity will lead to society's progress and prosperity." As the first technical research institute established by a construction company, KaTRI has consistently played a central role in upholding Kajima's reputation for technology.

In September 2013, KaTRIS became the first technical research institute of a Japanese construction company to open overseas, in Singapore. It has continued to evolve as a research center leading the way in the Kajima Group's advanced activities globally. While building a network with Singaporean government- and university-affiliated institutions, KaTRIS has been establishing a track record in providing technical support to Kajima Group companies overseas and technical consulting to local developers and design/engineering companies.



Kajima Technical Research Institute at its establishment in 1949

# Human Resources

Human resources are key assets that underpin our corporate activities. To create and provide high-quality services and make lasting contributions to society, it is important that employees exercise their individual skills and take pride in being members of the Kajima Group.

## Developing Human Resources

The Kajima Group is actively developing its human resources, as it believes in the importance of training highly-skilled specialists across a broad range of fields as well as management personnel capable of coordinating those specialists to fully meet the expectations of customers and the general public. The Group's human resource development policies rest on three pillars: **(1) giving young and mid-career employees opportunities to acquire professional skills, knowledge and experience, (2) giving mid-level and higher management personnel opportunities to acquire management knowledge and experience, and (3) promoting personnel exchange within the Group.** On-the-job training (OJT) is our fundamental approach in human resource development, but we are also expanding off-the-job training, including tier-specific specialist education in all organizations, Group-wide management training, and opportunities for employees around the world to study both in Japan and overseas.

### (1) Strengthening the Development of Young and Mid-Career Employees

To quickly develop autonomous and capable personnel, Kajima takes a systematic and flexible approach to providing practical experience in each division. Over the past few years, we have extended the reach of our practical construction training for engineers, as well as other training, to include mid-career employees with the aim of continually raising the level of employee expertise.

## Diversity & Inclusion

### (1) Promoting Active Roles for Women

Kajima believes it is essential to create an environment in which people from diverse backgrounds – from different sexes, nationalities, religions and degrees of disability – take on active roles in which they can fully express their individuality and skills. We have been promoting active roles for women as part of our efforts in this regard.

Our targets are to double the number of female engineers and women in managerial positions over the five-year period from 2014 and to triple the number in both categories over a 10-year period. To achieve these targets, in 2016 we formulated Kajima Corporation First Action Plan, based on the Act on Promotion of Women's Participation and Advancement in the Workplace, with the aim of having women account for 20% or more of main career track hires and, while maintaining this level, to double the number of women in managerial positions.

The range of work done by female employees, including work

We also provide training programs at overseas subsidiaries and offer opportunities for overseas study. These programs foster global human resources with a broad perspective, specialized skills, and the strong communication skills needed in international markets.

Note: Number of employees sent to study abroad over the most recent three years: 5 in fiscal 2017; 8 in fiscal 2018; 12 in fiscal 2019 (projected)

### (2) Fostering Management Personnel

To foster management personnel who will drive the Kajima Group's business overall, we provide opportunities for employees to acquire managerial experience in challenging and responsible positions, and are expanding personnel exchange and joint training within the Group. We are also systematically expanding our entry-, mid- and advanced-level training to ensure the acquisition of essential management and leadership skills.

Note: A total of 490 persons took these courses in fiscal 2018.

### (3) Encouraging Intra-Group Personnel Exchange

To foster human resources and promote exchange within the Group, Kajima actively conducts personnel exchange and OJT, including rotation of personnel among Group companies in Japan and overseas (429 participants as of the end of fiscal 2018) and training in Japan for engineers and other personnel from overseas Group companies such as KOA and Chung-Lu Construction (15 participants in fiscal 2018).

outside of Japan, has expanded. In particular, the number of female engineers overseeing construction site fieldwork is growing.



Engineers overseeing construction at Woodleigh Development Project (Singapore)

## (2) Improving Work-Life Balance

To improve the balance between work and private life not only for women but for all employees, Kajima has been creating workplace environments and enhancing systems to reassure employees that they can continue working in active roles while attending to various life events such as raising children and caring for family members.

We encourage men and women to share the responsibility of raising children, and our efforts to promote this have led to an increase in the number of male employees taking advantage of the flexible, shortened work-hour program for parenting. As for family caregiving, we held a total of 13 seminars at the Head Office and all branches in fiscal 2018 to address the “2025 Problem,” referring to the year by which Japan’s entire baby-boomer generation will be 75 years of age or older. At the same time, we distributed an in-house publication titled *Support Handbook for Balancing Work and Nursing Care Responsibilities* to all employees. In fiscal 2019, we will hold additional seminars for employees residing in the Tokyo metropolitan area, and distribute an additional copy of the handbook to each employee for use by the employee’s parents.

Going forward, we will encourage employees to take their allotted leave and will promote “no overtime” days, in addition to stepping up efforts to facilitate work-life balance through support for volunteer activities, parenting and family caregiving.

## Improving Employee Health

Kajima has set up a clinic within the Head Office to make it easier for employees to receive medical examinations, and works closely with all business locations nationwide to manage employee health from a medium-to-long-term perspective. We ensure that employees undergo regular medical examinations and receive treatment advice, and actively provide healthcare guidance from health nurses and other follow-up. Emphasizing preventive care and early response with respect to employee mental health, we conduct stress checks in line with the Industrial Safety and Health Act to improve self-care (health management by employees themselves)

## (3) Enhancing Personnel Systems to Realize Flexible Work Styles

Kajima is enhancing its personnel systems and programs to establish workplace environments in which each and every employee can work with enthusiasm and realize flexible work styles that take into account the workloads and other special features of each workplace.

### Enhancements to Personnel Systems and Programs

#### Implemented in November 2018

- Established new system giving supervisors more discretion over subordinates’ daily starting and finishing times
- Introduced calculation of annual paid leave by the hour
- Introduced system of minimum break time between work shifts
- Enhanced system of flex-time hours for parents
- Enhanced program for balancing work and medical treatment

#### Implemented in April 2019

- Established new program for family support leave

#### Scheduled to be introduced in fiscal 2019

- Telecommuting program
- Rehiring program for former Kajima employees



**Katsunori Ichihashi**

Executive Officer  
General Manager, Executive Office,  
Overseeing Human Resources  
Department and Center for  
Shared Administrative Services

In its corporate philosophy, Kajima advocates “working together as one to pursue creative progress and development founded on both rational, scientific principles and a humanitarian outlook.” This humanitarian and family-oriented tradition is a source of our competitiveness, and we will continue to adhere to this philosophy as we move forward.

Nevertheless, our business environment is constantly changing. While maintaining the competitive advantages we have cultivated thus far, we need to steadily expand our business domains both upstream and downstream on the construction value chain and extend those domains globally. Given the increasingly diversified workforce needed for these purposes, we will not be able to succeed amid intensifying competition unless we put the right people in the right places.

We intend to utilize the new HR systems set to go into effect this autumn to get a detailed understanding of the motivations and characteristics of individual employees, and then consider compatibility with the wide spectrum of careers and fields in which they can fully exercise their capabilities.

With all employees at the Kajima Group making use of their individual experience and aptitude to enhance their professional lives, we hope to set in motion a virtuous cycle in which the Group achieves sustainable growth that enables both our employees and the Group to prosper materially and spiritually.

and workplace environments. The overall results of the stress checks conducted in fiscal 2018 (comprehensive health risk) showed stress levels about 20% lower than the national average.

These efforts have been held in high regard, and as a result, Kajima was selected under the 2019 Certified Health & Productivity Management Outstanding Organizations (White 500) Recognition Program by the Ministry of Economy, Trade and Industry. It was the second year in a row for Kajima to be selected. We will continue ascertaining the health issues facing employees and undertaking various efforts to improve employee health.

# Building a Relationship of Mutual Trust with Customers

## QSE Policy

(common to the three areas of quality assurance, safety and health, and the environment)

Quality assurance, safety and health, and environmental management are fundamental to production and corporate survival. By establishing and continuously improving management systems to comply with relevant laws, ordinances, and other societal requirements, Kajima works to produce efficiently while earning the trust of clients and society.

### Quality Assurance Policy

Kajima provides products and services that satisfy clients, from marketing to follow-up services, allowing them to place orders with a sense of reassurance and trust.

- 1 We ensure product quality by heeding and addressing client requirements and responding while thoroughly implementing the Plan-Do-Check-Act (PDCA) cycle.
- 2 We enhance research and development and plan ways to improve quality and increase operational efficiency.

### Safety and Health Policy

Safety is the barometer of a company's capabilities and ethics. We therefore collaborate with partner companies with strong management to eliminate construction-related accidents and injuries so we can maintain public trust in the construction industry while pursuing sustainable corporate progress.

- 1 We work to prevent accidents and incidents stemming from human error by focusing on the workplace, equipment, and site conditions and by using point-call-and-response practices as routine workplace procedures.
- 2 We strive to create safe and comfortable working environments by facilitating close communication between Kajima and partner companies and by ensuring close coordination between people, machinery, and equipment.

### Environmental Policy

Kajima, as the company "Building for the Next 100 Years," pursues a unique long-term environmental vision, doing its part in the broader social efforts to preserve the environment and ensure economic sustainability.

- 1 We work to reduce the environmental impact of our business and take into consideration the entire lifecycle of the structures we construct. We thereby seek to help build societies which use materials responsibly, have a low carbon footprint, and harmonize with nature.
- 2 As a standard for achieving these goals, Kajima:
  - Creates innovative technologies that help safeguard the environment and use resources sustainably;
  - Engages in construction management processes to prevent environmental damage caused by hazardous materials used in construction projects; and
  - Cooperates with the public, including by proactively disclosing information.

# Quality

Based on the trust it has earned from customers and its reputation for providing reliable quality over its long history, Kajima has continued to receive project opportunities. Operating since 2015 under the slogan of “Building with the heart and soul of a craftsman,” we will maintain our principle of focusing primarily on construction site operations in providing services of value to both customers and the public at large.

## Management System

Kajima has received ISO 9001 certification in both its civil engineering and building construction businesses and has been managing quality accordingly. These certifications cover relevant Head Office departments, the Technical Research Institute, the Architectural Design Division and branches. Overseas Group companies have obtained relevant certifications. The civil engineering and building construction businesses have both prepared manuals and implementation guidelines and are implementing their own management systems.

## Civil Engineering Business

A Civil Engineering Work Manual was prepared in 1996 and has been subsequently revised as necessary in order to provide civil engineering structures that meet the demands of customers, regulations and interested parties; improve customer satisfaction; effectively carry out quality assurance, safety and health, and environmental management; and improve overall performance.

## Building Construction Business

In 2002, Kajima developed the Kajima Building Construction Total Management System (KTMS), the industry’s first such system, as a manual for mission-critical tasks. KTMS sets out the work flow, construction site administrative rules, document storage rules and other guidelines that serve as the basis for project operation. We have made numerous revisions since then to ensure that these guidelines remain relevant in view of diversifying and increasingly sophisticated customer needs, the establishment of and need for stricter compliance with new laws and regulations, and quality assurance/environmental incidents that have occurred both inside and outside the Company.

Under the Medium-Term Business Plan (Fiscal 2015-2017) formulated in May 2015, the building construction business prioritized becoming involved in projects from the early stages, focusing on productivity improvements, and quickly discovering and addressing construction risks. Accordingly, in 2017 we began implementing KTMS-2017, which contains across-the-board revisions incorporating these priorities as routine procedures.

Kajima Head Office ISO 9001 and ISO 14001 Certifications	Certification Name	Certifying Body
Kajima Corporation	ISO 14001:2015	MSA
Management System Assessment Center Co., Ltd. Note: All 11 branches are registered (International Division is registered under the civil engineering business.)		Recertified: November 28, 2017 Valid through: December 16, 2020
Kajima Corporation civil engineering business	ISO 9001:2015	MSA
Kajima Corporation building construction business		
Note: ISO 9001 certifications for relevant Head Office departments, the Technical Research Institute, the Architectural Design Division and branches are covered as a whole under “civil engineering business” or “building construction business.”		Recertified: November 28, 2017 Valid through: December 23, 2020
Engineering Division	ISO 9001:2008	MSA

Other Certifications, etc.	Certification Name	Certifying Body
Architectural Design Division, Head Office of ARMO Co., Ltd.	ISO/IEC 27001:2013	BSI
Engineering Division	ISO 27001:2013	MSA
International Division	OHSAS 18001:2007	MSA

Certifications, etc., of Domestic and Overseas Group companies	Certification Name	Certifying Body
Kajima Road Co., Ltd.	ISO 9001:2015	MSA
	ISO 14001:2015	MSA
Kajima Environment Engineering Corporation	ISO 14001:2015	MSA
Kajima Tatemono Sogo Kanri Co., Ltd.: cleaning services (7 properties), facility management (1 property)	ISO 9001:2015	MSA
	ISO 9001:2008	MSA
Kajima Mechatro Engineering Co., Ltd.	Eco-Action 21	Institute for Promoting Sustainable Societies
	ISO 9001:2015	JIC Quality Assurance Ltd.
Kajima Renovate Construction Co., Ltd.	ISO 14001:2015	JIC Quality Assurance Ltd.
	ISO 9001:2015	MSA
Clima-Teq Co., Ltd.	ISO 14001:2015	MSA
	ISO 9001:2015	MSA
Kobori Research Complex Inc.	ISO 9001:2015	MSA
Toshi Kankyo Engineering Co., Ltd.	ISO 14001:2015	MSA
	ISO 27001:2013	MSA

# Framework for Ensuring Safety

Kajima is responsible for the safety and health management of everyone involved in construction site operations. Our role as the prime contractor is to develop plans and manage risks so that foremen and workers from partner companies involved in operations at construction sites can perform their duties confident that their equipment and working environment are safe.

In fiscal 2018 at Kajima construction sites in Japan, there were 66 accidents with lost work time of four or more days, including one fatal accident. The frequency rate of accidents resulting in lost work time of four or more days was 0.68, and the rate for accidents resulting in lost work time of one or more days was 1.49, resulting in a severity rate of 0.11. Under the slogan “Think safety! Make today accident free,” we will continue to do our utmost to ensure a safety-first approach to work.

## Safety Performance

(FY)		2014	2015	2016	2017	2018
Accident frequency rate	Lost work time of 4 or more days	0.93	0.80	0.66	0.78	0.68
	Lost work time of 1 day or more	1.99	1.37	1.14	1.41	1.49
Accident severity rate		0.16	0.28	0.18	0.36	0.11
No. of accidents		102	83	64	70	66
No. of fatalities		2	3	2	4	1
Cumulative working hours (Millions of hours)		109.32	104.25	97.15	89.65	96.71

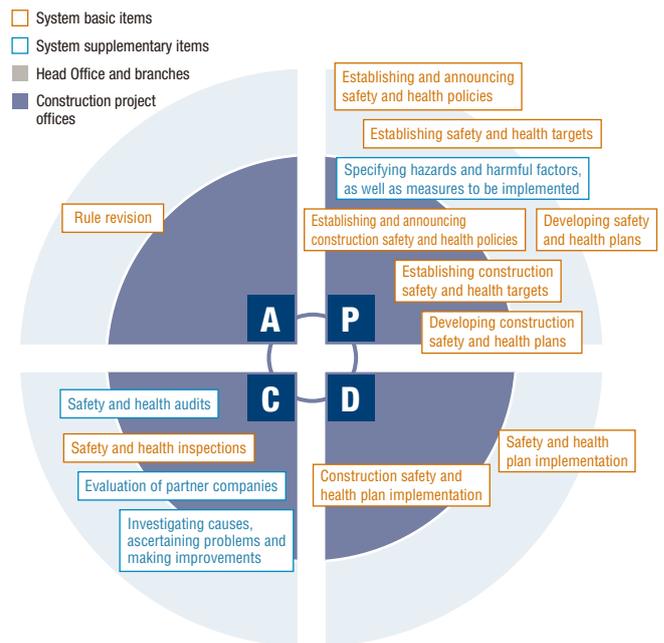
Frequency rate: The number of fatalities and injuries at worksites per one million cumulative working hours

Severity rate: The severity of illnesses and injuries represented by the number of workdays lost per one thousand cumulative working hours

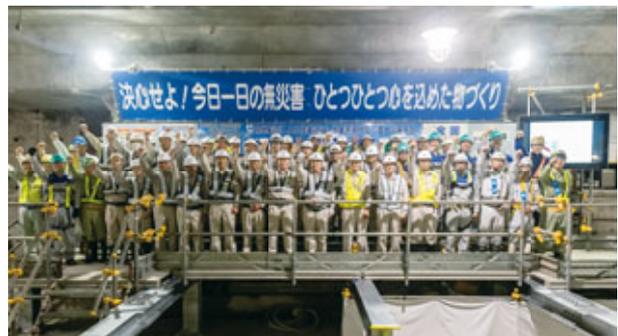
## Management System

Kajima has been implementing safety and health management in conformance with the Construction Occupational Health and Safety Management System (COHSMS).

We follow a Plan-Do-Check-Act (PDCA) cycle of reviewing our safety and health policies as necessary based on the performance and circumstances of the previous fiscal year, and then formulating Company-wide safety and health targets and plans for the current fiscal year. Starting from the Company-wide policies formulated through this cycle, we narrow down the range of issues to determine the priority items to be implemented at individual construction project offices as well as those for the Head Office, branches and partner companies supporting them. We then use these items as a foundation for establishing construction safety and health policies, targets, and plans for each construction site, to be shared with partner companies in carrying out construction work. In addition, by focusing on actual workplaces, equipment, and site conditions through regular patrols, we will keep improving safety and health levels.



Receiving Ministry of Health, Labour and Welfare award (Ensuring Health: Improving Health) as an outstanding workplace contributing to safety and health in connection with the Fukuoka High-District-Family-Simplified Court Building Construction Project



President Oshimi takes part in a construction site patrol during National Safety Week

# Relationships with Business Partners

Partner companies are essential to Kajima's supply chain.

In selecting partner companies for construction work, we utilize outside organizations as well as our in-house system to evaluate candidates and manage the selection process to confirm that these companies have suitable construction capabilities. We conduct all procurement, including for equipment and materials, in a transparent, fair and appropriate manner in accordance with the Kajima Group's Corporate Code of Conduct. This means we observe laws, maintain equitable relationships with partner companies, eradicate antisocial activities, respect the cultures and customs of all nations and people, prohibit discrimination and unfair treatment, prohibit child labor and forced labor, and address environmental issues.

In the Medium-Term Business Plan (Fiscal 2018-2020), we have positioned "securing the next generation of workers" as a key tactic, with measures aimed at ensuring mutually beneficial relationships with our partner companies in five areas: hiring activities, improving the treatment of construction workers, education and training, workplace environments, and management platform.

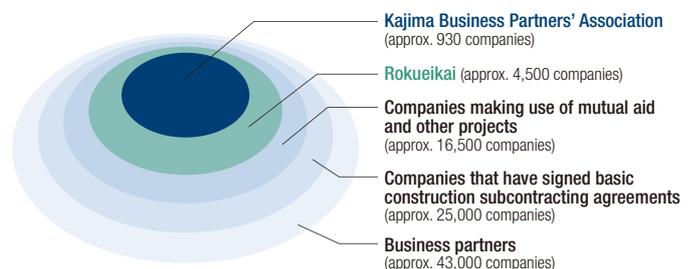
## Working together with the Kajima Business Partners' Association and Rokueikai

Kajima's partner companies formed the Kajima Business Partners' Association (approximately 930 companies nationwide), which engages in various projects in the spirit of mutual aid, as well as Rokueikai (approximately 4,500 companies nationwide), whose primary purpose is accident prevention activities. By coming together with partner companies through these organizations, Kajima forms strong partnerships that will ensure quality and safety.

### Kajima Business Partners' Association

Robust construction capabilities are essential to creating buildings and structures of reliable quality and safety. Comprising corporate partners that work with Kajima to bolster combined construction capabilities, the Kajima Business Partners' Association was established in 1974 by construction subcontractors who play key roles in the production system. In the spirit of mutual aid, the association carries out joint projects necessary for improving the financial status of its members. It also conducts a variety of projects

aimed at providing compensation/relief to victims of industrial accidents, fostering engineers and technicians, and improving construction standards. Working to strengthen collaboration and facilitate communication with Kajima, reinforce the management structure of members, and systematize guidance for members, the association has created an environment that is beneficial and efficient for both Kajima and its subcontractors. Among general contractors, such a framework is unique to Kajima.



## Pushing for a Five-Day Work Week

Kajima is increasing the implementation of a five-day work week at construction sites (site closures 104 days each year\*) in stages, beginning with a target of 50% of sites by the end of fiscal 2019. In the second stage, we will leverage internal initiatives aimed at

improving productivity to achieve implementation at 75% of sites by the end of fiscal 2020. Our ultimate goal is to have all construction sites operating on a five-day work week by the end of fiscal 2021.

\* 365 days x 2/7 (five-day work week) ≈ 104 days

### Five-day work week targets and implementation rates

	FY2017	FY2018	FY2019	FY2020	FY2021
<b>Targets</b>		—	50%	75%	100%
<b>Actual</b>		30%			



# Environment

## Kajima Environmental Vision: New Targets for Triple Zero 2050

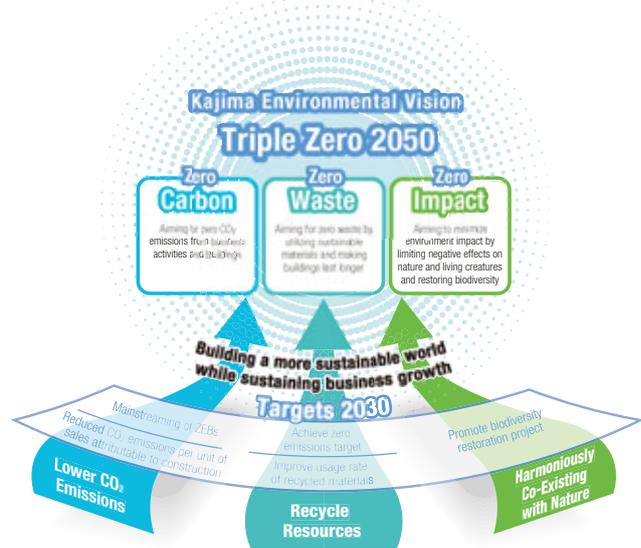
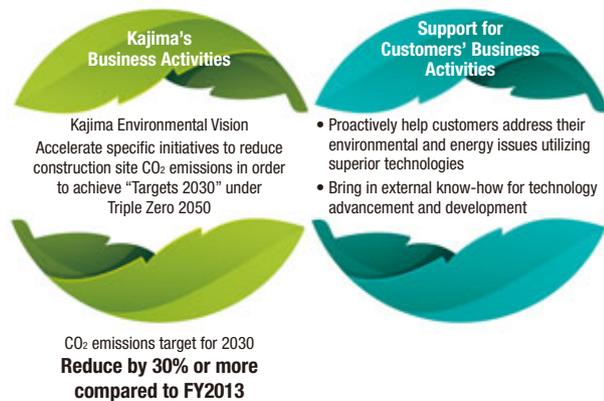
The priority environmental focus in the Medium-Term Business Plan (Fiscal 2018-2020) announced last year is “pursue environmental and energy opportunities for the business activities of the Kajima Group and its customers.” We are stepping up specific efforts in our own business activities to reduce carbon dioxide (CO<sub>2</sub>) emissions at construction sites, as well as utilizing our superior technologies to help customers address their environmental and energy issues.

Formulated in 2013, the Kajima Environmental Vision: Triple Zero 2050 is the basis of our environmental initiatives. Our ultimate goals in the areas of CO<sub>2</sub> reduction, resource recycling and harmonious co-existence are, respectively, zero carbon, zero waste, and zero

impact. In particular, to reflect the signing of the Paris Agreement and the rise in ESG investment, we established new targets for reducing CO<sub>2</sub> emissions. We aim to reduce our CO<sub>2</sub> emission intensity (t-CO<sub>2</sub>/¥ hundred million of sales) by 30% compared to fiscal 2013 by 2030, and by 80% no later than 2050.

We developed the Environmental Data Evaluation System (edes) in fiscal 2018 to reduce energy use at construction sites, and conducted trial runs at several sites. (See page 60 for details.)

### Strengthening Long-Term Environmental and Energy Initiatives



### Triple Zero 2050 (Revised May 2018)

	Social Goals	Triple Zero 2050	Targets 2030	Environmental Targets
Building a More Sustainable World	<b>Lower CO<sub>2</sub> Emissions</b> Balancing greenhouse gas emissions from human activities with the Earth's capacity for CO <sub>2</sub> absorption	<b>Zero Carbon</b> Aiming for a zero carbon footprint by reducing the Group's greenhouse gas emissions (Scope 1, 2, and 3 emissions) by at least 80% compared to fiscal 2013	<b>Group-wide</b> Reduce Group-wide greenhouse gas emissions (Scope 1 and 2 emissions) per unit of sales to 30% of fiscal 2013 level or lower (equivalent to a 30% reduction of total emissions with fixed construction amount); contribute to the reduction of Scope 3 emissions as well, through joint efforts in the supply chain <b>Construction Operations</b> Lower construction site greenhouse gas emissions per unit of sales to 30% of fiscal 2013 level or lower <b>Architectural Design</b> Lower CO <sub>2</sub> emissions in the operation stage of newly completed buildings by at least 30% compared to Japan's energy-saving standard Mainstream ZEB Ready buildings and pursue net ZEB for flagship projects	Three-year (FY2018-2020) environmental targets have been set for each sector and activities are under way (See pages 60-61 for details.)
	<b>Recycle Resources</b> Pursuing zero emissions by employing state-of-the-art infrastructure maintained and operated using sustainable resources	<b>Zero Waste</b> Aiming to eliminate waste from construction operations by ensuring zero landfill disposal of waste during construction, utilizing sustainable materials, and making buildings last longer	Completely eliminate final landfill waste from construction operations Achieve a usage rate of recycled materials of at least 60% for principal construction materials (steel, cement, ready-mixed concrete, crushed stone and asphalt)	
	<b>Harmoniously Co-Existing with Nature</b> Valuing the continuous benefits of ecosystem services by minimizing the impact of human activities on the environment and living creatures	<b>Zero Impact</b> Aiming to minimize the overall environmental impact of construction operations by limiting their effect on nature and living creatures while promoting the restoration of biodiversity and new ways to make use of its benefits	Promote biodiversity restoration projects Build a portfolio of effective projects and make them hubs for biodiversity-related networking	
	<b>Common Foundation Initiative Areas</b>	<ul style="list-style-type: none"> <li>Management of hazardous substances: Ensure preventative measures (especially for soil contamination and asbestos) and proper management of chemical substances</li> <li>Conduct research and technology development</li> <li>Actively distribute information in and outside the Company</li> </ul>		

## Helping Customers Address Their Environmental and Energy Issues

Kajima provides technologies and services to support the business activities of its customers and help them address their environmental and energy issues in the areas of lower CO<sub>2</sub> emissions, recycling resources, and harmoniously co-existing with nature.



**Lower CO<sub>2</sub> Emissions**

- Zero energy buildings (ZEB)
- Energy management
- Renewable energy utilization

etc. 

**Recycling Resources**

- High-efficiency energy recovery from organic waste
- Advanced wastewater treatment system
- Energy recycling

etc. 

**Harmoniously Co-Existing with Nature**

- Soil and groundwater contamination control
- Waste and hazardous substance treatment
- Green infrastructure

etc. 

### Highlight 1: Lower CO<sub>2</sub> Emissions

### Helping substantially cut CO<sub>2</sub> emissions not only during construction but also during the manufacture of construction materials and during facility operation

Kajima completed the F-Place (Fujisawa Community Hall and Vocational Center Multipurpose Public Complex) in February 2019. We were awarded this contract through a competitive bidding process that involved a comprehensive evaluation based on a design/build package order formula. This public structure, which obtained Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) third-party certification, employs barrier-free universal design to give everyone easy access, as well as natural lighting, natural air circulation, and a solar power generation system for higher energy-saving performance. During a building's lifecycle, CO<sub>2</sub> emissions are highest following handover to the customer, but we will be assisting in significantly reducing CO<sub>2</sub> emissions during the building's operation as well.

The EcocreteR<sup>3</sup> ultra-low-carbon concrete developed by Kajima was used extensively for the first time in constructing this facility. EcocreteR<sup>3</sup> is an eco-friendly concrete that uses recycled waste ready-mixed concrete\* as a raw material, thereby helping recycle resources and reduce CO<sub>2</sub> emissions. For this project, 6,000 cubic meters of such concrete was used in the building's skeleton, reducing by about 600 tons the volume of waste ready-mixed concrete generated in Fujisawa City during the construction period and cutting CO<sub>2</sub> emissions during concrete manufacture by about 480 tons compared with conventional concrete.

\* Ready-mixed concrete returned to the plant unused for some unavoidable reason, such as its use in inspections when taking delivery

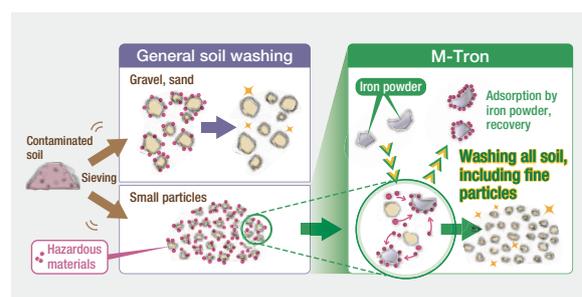
### Highlight 2: Resource Recycling

### "M-Tron<sup>®</sup>" full remediation technology for soil contaminated with heavy metals 2016 Engineering Commendation Award from The Engineering Advancement Association of Japan (ENAA) and 2016 Environmental Award from the Japan Society of Civil Engineers (JSCE)

Soil contamination as a result of naturally occurring arsenic and/or lead often extends over wide areas, and contaminated soil has also been confirmed at former sites of metal-processing, chemical and many other types of plants. Upon determining the presence of heavy metals such as arsenic or lead, the conventional approach has been to excavate the contaminated soil, move it off-site, and replace it with the same volume of uncontaminated soil. The excavated soil can also be decontaminated on-site but, as contaminants cannot be completely removed from fine-particle soil, residual soil and the muddy water containing hazardous materials must be moved off-site as industrial waste.

Combining this washing approach with Kajima's M-Tron technology enables full remediation of soil contaminated with heavy metals. M-Tron uses special iron powder with superior adsorption properties to adsorb heavy metals, and then employs a strong magnetic field generated by a superconducting magnet to efficiently recover the iron powder that has adsorbed hazardous materials from the mud and thereby remove those materials.

The winner of the 2016 Engineering Commendation Award from The Engineering Advancement Association of Japan (ENAA) and 2016 Environmental Award from the Japan Society of Civil Engineers (JSCE), M-Tron has been applied at shield construction sites, among others.



## Management Systems

Kajima operates environmental management systems (EMS) that are compliant with ISO 14001. The Environment Committee is headed by the President and implements initiatives in each of five sectors: civil engineering, building construction, environmental engineering, engineering, and research and development.

Four subcommittees address environmental management,

construction environments, sustainable procurement, and biodiversity as cross-sector issues.

Environmental initiatives for domestic Group companies are primarily focused on construction-related companies, due to their high environmental impact.

## Summary of Environmental Activities for Fiscal 2018

Fiscal 2018 was the first year of Kajima's newest three-year plan. We revised the CO<sub>2</sub> emission targets in the Kajima Triple Zero 2050 Environmental Vision at the beginning of the fiscal year to reflect the signing of the Paris Agreement and rising investment in ESG. In line with reduction targets set for Japan, we committed to reducing our CO<sub>2</sub> emission intensity (t-CO<sub>2</sub>/¥ hundred million of sales) by 30% compared to fiscal 2013 by 2030 and by 80% no later than 2050.

In pursuing lower CO<sub>2</sub> emissions, we changed our benchmark for CO<sub>2</sub> intensity attributable to construction from the fiscal 1990 level to the fiscal 2013 level, far surpassing the 4% CO<sub>2</sub> emissions reduction target with a 9% reduction. In recycling resources, we changed our final disposal rate target in fiscal 2018 to include

sludge to promote its recycling. However, the actual rate for the fiscal year was 4.3%, falling short of the target of less than 3%. In seeking to harmoniously co-exist with nature, we caused no environmental impact through hazardous materials or polluted water, although there were two minor procedural violations of the Waste Management and Public Cleansing Act.

As the Soil Contamination Countermeasures Act was set to undergo major revisions in April 2019, Kajima made various preparations during fiscal 2018, including holding briefings for Head Office and branch sales personnel, and "environmental fairs" for customers of individual branches to explain the impact of these revisions on business activities.

## Launch of Environmental Data Evaluation System (edes) to Reduce Energy Use at Construction Sites

About 90% of Kajima's CO<sub>2</sub> emissions from its own business activities are generated at construction sites. Nearly 30% of energy consumed on-site is electricity, and 70% is the diesel oil used in heavy machinery and elsewhere. We have been implementing energy-saving activities and offering instruction in fuel-efficient operation, and have ascertained the CO<sub>2</sub> emissions of the Company as a whole using sampling data from studies of energy consumption at construction sites conducted over a set period vis-à-vis the value of finished work.

To effectively reduce CO<sub>2</sub> emissions during construction, it is necessary to know the emissions per construction site and then implement timely and appropriate countermeasures tailored to the conditions of each site.

For this reason, we developed the Environmental Data Evaluation System (edes), which enables users to ascertain and visualize CO<sub>2</sub> emissions for all processes at all construction sites on a monthly

basis. The system aggregates and visualizes monthly data on CO<sub>2</sub> emissions, waste generation, and water use from each construction site. Following trials at several sites in fiscal 2018, we put the system into full-scale operation at building construction sites in June 2019. The types, numbers and operating hours of construction machinery operated on-site as well as other information are linked to existing construction management support services and the data is automatically imported into edes, enabling the calculation of CO<sub>2</sub> emissions during construction. By adding the CO<sub>2</sub> emissions from electricity consumption and from the fuel used in vehicles conveying soil/sand and waste, the system has enabled us to ascertain actual figures for each work site on a monthly basis.

As indicated in Triple Zero 2050, we will accelerate our efforts to lower CO<sub>2</sub> emissions by comparing the figures for each construction site and branch to derive effective reduction measures, and by deploying these measures at other locations nationwide.

## Environmental Targets (FY2018-2020) and FY2018 Actual Figures

		Three-Year (FY2018–2020) Targets	FY2018 Targets	FY2018 Results
Lower CO <sub>2</sub> Emissions	Construction	Reduce CO <sub>2</sub> emissions per unit of sales attributable to construction by 8% compared to fiscal 2013	Reduce CO <sub>2</sub> emissions by 4%	Reduced CO <sub>2</sub> emissions by 9%
	Design	Secure conformance with QCDSE (Quality, Cost, Design, Safety, Environment) mandatory standards in Building Energy Efficiency Act  Develop industry-leading CO <sub>2</sub> emissions targets	Implement action plans that conform with mandatory standards in Building Energy Efficiency Act  Actively utilize labeling programs such as the Building Energy-efficiency Labeling System (BELS)  Achieve corporate targets for energy efficiency (20% reduction)	Set and managed original issues in line with building use  Numerous projects for which efforts are underway to obtain BELS, CASBEE New Structure, CASBEE Wellness Office, LEED NC and other certifications  One CASBEE New Structure certification obtained  23.2% reduction
Recycle Resources	Construction	Less than 3% landfill waste including sludge	Less than 3% landfill waste including sludge	Final disposal rate of 4.3% (including sludge)
	Design	Implement green procurement  Design buildings with a longer life	Propose more than four items, indicate them on working drawings, and verify whether or not the proposed items were ultimately adopted  Attain a score of at least 3.6 for evaluations based on in-house check sheet	Average of 5.3 items proposed  Evaluation: Average of 3.64
Harmoniously Co-Existing with Nature		Implement outstanding biodiversity projects	Implement more than six outstanding biodiversity projects per year	Selected nine outstanding projects
		Reduce the environmental impact of construction (particularly through management of hazardous materials and polluted water management, etc.)	Limit the environmental impact of construction (particularly through management of hazardous materials and polluted water, etc.)	No environmental impact from hazardous materials or polluted water (Two minor procedural violations of the Waste Management and Public Cleansing Act)
Common Foundation Initiative Areas	Implement R&D and promote technologies and services that support Triple Zero 2050 objectives			
	R&D	Implement research and technology development that contributes to preservation of the environment and sustainable use  More than six examples of deploying research or technology results to onsite operations over the three-year period	Environmental contribution R&D projects: 6  Environmental contribution technology projects deployment: 2	Designated environmental topics: 18  Results deployed: 3 instances
	Environment Engineering	Promote environmental management in concert with Group companies  Make technical innovations and create projects based on Triple Zero 2050	Improve environment-related proposal capabilities, pursue project making	Strengthened efforts in four priority fields  Efforts toward next-generation technologies/projects, environmental fairs held in collaboration with branches (3 times)
	Engineering	Provide customers with high-environmental performance production facilities	Confirm Triple Zero 2050 approaches and measures for dealing with chemical substances in projects	Confirmation at Division Design Review, project review committees (reviews conducted for all 14 target projects)

## Material Flow

### Input

		FY2018
Construction sites	• Energy	
	• Electricity (kWh)	93,580,000
	• Diesel oil (kℓ)	75,703
	• Kerosene (kℓ)	2,137
	• Water (m <sup>3</sup> )	713,000
	• Main construction materials (t)	2,189,000
Offices	• Energy	
	• Electricity (kWh)	25,440,000
	• Heavy oil (kℓ)	11
	• Kerosene (kℓ)	10
	• Gas (m <sup>3</sup> )	157,000
	• Heating/Steam/Cooling (GJ)	16,755
	• Water (m <sup>3</sup> )	156,000

### Output

		FY2018
Construction sites	• CO <sub>2</sub> emissions (t)	251,000
	• Construction surplus soil (m <sup>3</sup> )	750,000
	• Hazardous materials collected	
	• Materials containing asbestos (t)	56,926
	• CFCs and halon (t)	1.5
	• Fluorescent tubes (t)	77.9
	• Construction waste (t)	1,994,000
	• Final disposal volume (t)	85,000
Offices	• CO <sub>2</sub> emissions (t)	14,000
	• Volume of waste (t)	2,036.4