### **Corporate Outline**

President

Phone

Capital

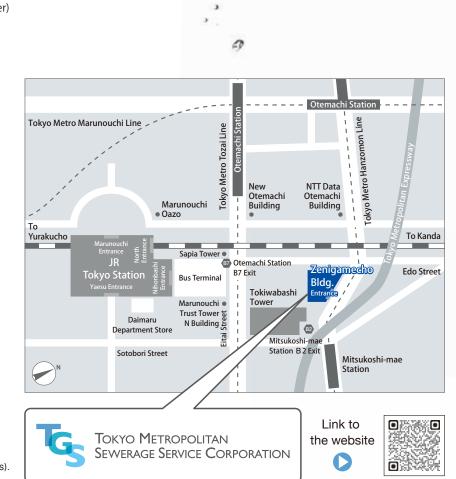
URL

Corporate name Tokyo Metropolitan Sewerage Service Corporation Mamoru Kamiyama Zeniganecho Bldg., Otemachi 2-6-3, Chiyoda-ku, Headquarters Tokyo 100-0004 JAPAN +81-3-3241-0711 (Main number) https://www.tgs-sw.co.jp/ 100 million yen 25,624 million yen (FY 2021) Sales amount Established on August 1, 1984 957 (as of April 1, 2022) No. of employees Tokyo Metropolitan Stockholders Government Tokyo Sewerage Facility Association Sompo Japan Insurance Inc. Meiji Yasuda Life Insurance Company Mizuho Bank, Ltd. Mizuho Trust & Banking Co., Ltd. MUFG Bank, Ltd. Asahi Mutual Life Insurance Co. Tokio Marine & Nichido Fire



Insurance Co., Ltd.

We support the Sustainable Development Goals (SDGs).



# ISO 9001

JQA-QM3589

Acquisition of ISO 9001 Certification Scope of Registration:

dewatering, and incineration process) plants

#### Applicable Offices:

1 Operation and maintenance of sewage sludge Miyagi Sludge Office, Shingashi Sludge Office, Morigasaki treatment facilities (condensation, digestion, Sludge Office, Kasai Sludge Office, Ariake Office, Shinjuku Water Recycling Office, Shibaura Water Recycling Office, 2 Operation and maintenance of water recycling Eastern Region Sludge Office, Southern Region Sludge Office



Published in April 2023 5-001

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TOKYO METROPOLITAN SEWERAGE SERVICE CORPORATION

**Corporate Profile** 

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### Message from the President

Tokyo Metropolitan Sewerage Service Corporation (TSG: Tokyo Gesuido Service) was established in 1984 to pursue efficiency and economy, while continuing to serve the public welfare, by integrating and utilizing the funding and technological capabilities of the Tokyo Metropolitan Government and private companies.

Since that time, we have worked to maintain and improve sewerage service as a member of the Tokyo Metropolitan Government group through integrated business operation with the Bureau of Sewerage, Tokyo Metropolitan Government. In April of 2022, TGS was entrusted with the overall management of the Ochiai sewage treatment plant. As a result, the projects that we started when TGS was established, which centered on sludge treatment, have now grown to include comprehensive responsibility from upstream services related to sewers to downstream, encompassing work from maintenance management and design/construction management of sewer pipes to the operation and maintenance management of sewage treatment plant, pumping stations and sludge treatment facilities.



President and Representative Director

### Mamoru Kamiyama

Utilizing our accumulated advanced technologies, know-how and human resources, we have also become a driving force for the sewerage industry through efforts which are not limited to

the Tokyo Metropolitan area, but also include other parts of Japan as well as overseas countries, for example, human resources development and transmission of technologies to the next generation, support in time of disasters and international expansion of Tokyo-originated sewerage technologies.

In the future, we will contribute to realizing a sustainable society by supporting safe, pleasant life and the growth of the Tokyo Metropolitan area through the concerted efforts of all our employees, to ensure that sewers function 24 hours a day, 365 days a year, utilizing the sewerage business operation capabilities we have developed to date.

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### **Corporate Philosophy**

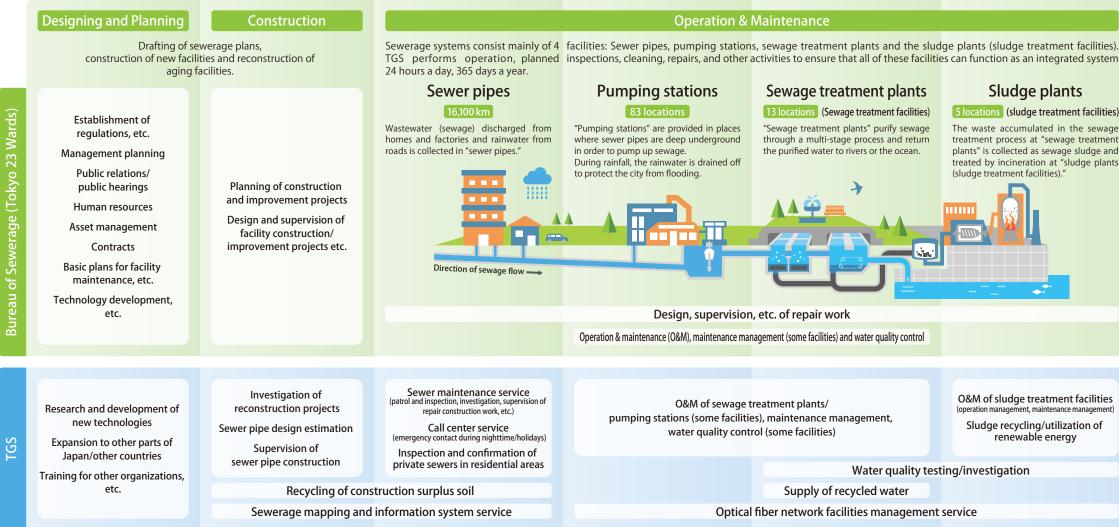
## Using the power of sewerage to make a sustainable society the "new normal"



Sewerage has 3 basic roles in supporting life and the urban cities: "Treating sewage to ensure a clean, healthy environment in the city," "Protecting the city from floods" and "Protecting the water environment of oceans and rivers." It also has diverse roles in recycling sewage as a resource and effectively utilizing its energy, including "Recycling sludge as a resource," "Reusing treated water," "Use of digestion gas and heat," etc.

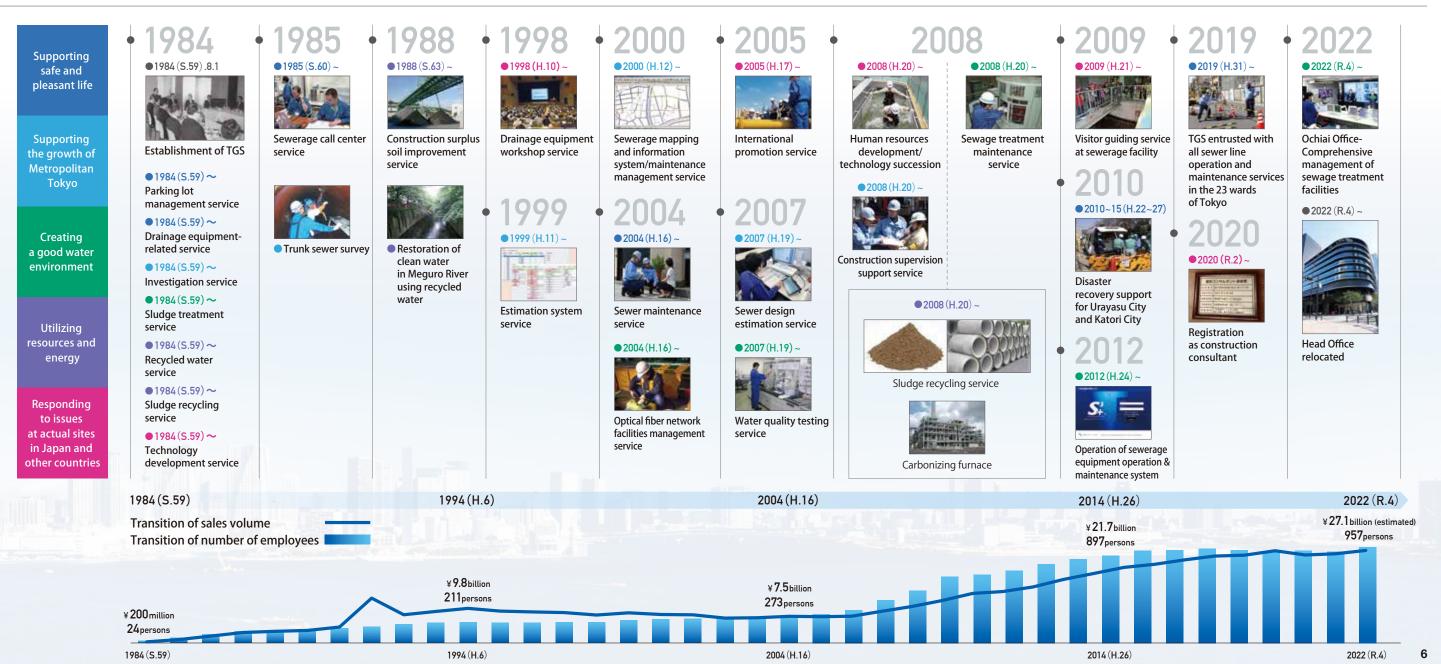
Correct functioning of the sewerage system contributes to protecting the day-to-day lives of Tokyo residents and preserving the environment, including rivers and oceans.

Based on its sharing roles with the Bureau of Sewerage (Tokyo 23 wards), Tokyo Metropolitan Government, the Tokyo Metropolitan Sewerage Service Corporation (TSG) is responsible for front-line work at the actual site in each of the stages of "Designing and planning," "Construction" and "Operation and maintenance," and is working to ensure the functioning of the sewerage system.



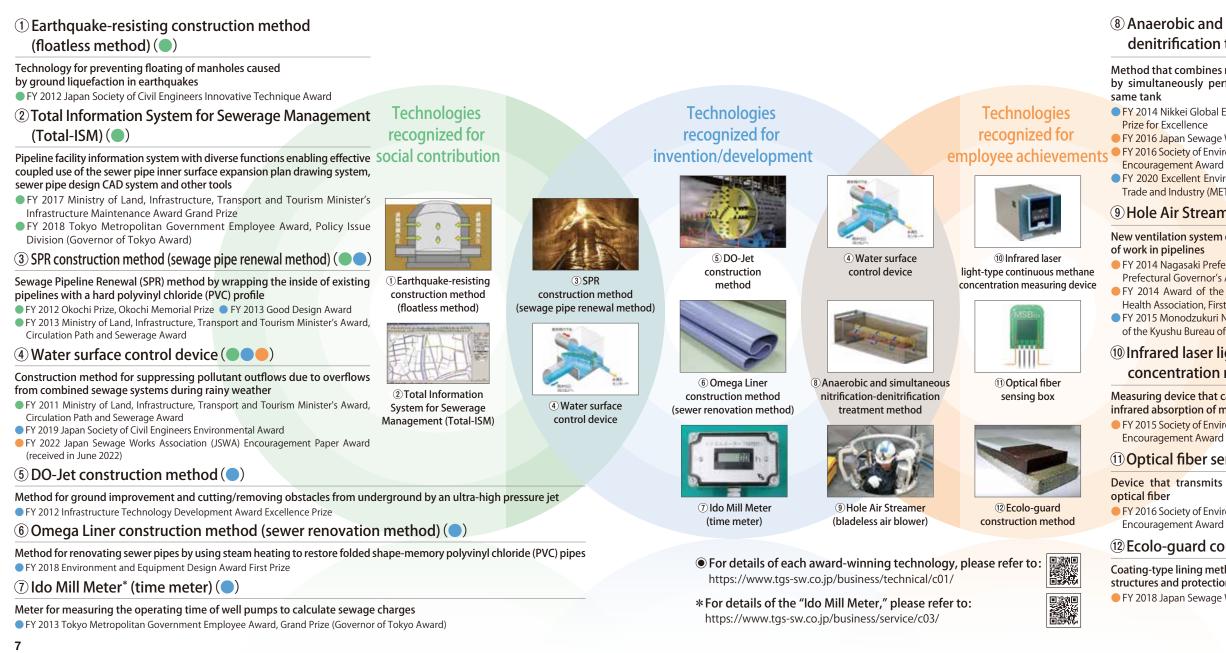
## History of TGS

TGS was established as an organization that performs precise operation and maintenance of Tokyo's vast system of sewerage facilities. Since then, we have steadily operated, developed and expanded our businesses in response to changes in the social environment surrounding the sewerage business, the expectations of society, and other needs.



## Main Award-Winning Technologies

TGS is actively engaged in technology development to solve the problems facing the Tokyo sewerage system based on ideas proposed by workers at frontline sites. The developed technologies have been adopted not only in the Tokyo Metropolitan area, but also in other parts of Japan and overseas, and have earned a high evaluation, including winning many prestigious awards, etc.



### (8) Anaerobic and simultaneous nitrificationdenitrification treatment method (

#### Method that combines nitrogen treatment and the anaerobic method by simultaneously performing digestion and denitrification in the

- FY 2014 Nikkei Global Environmental Technology Award,
- FY 2016 Japan Sewage Works Association Excellent Paper Award
- FY 2016 Society of Environmental Instrumentation, Control and Automation
- FY 2020 Excellent Environmental Equipment Award, Ministry of Economy, Trade and Industry (METI) Minister's Award

### (9) Hole Air Streamer (bladeless air blower) (

## New ventilation system developed with the aim of improving the safety

- FY 2014 Nagasaki Prefecture Invention and Innovation Exhibition,
- Prefectural Governor's Award
- FY 2014 Award of the Japan Construction and Occupational Safety and Health Association, First Prize
- FY 2015 Monodzukuri Nippon Grand Award, Award of the Director-General of the Kyushu Bureau of Economy, Trade and Industry

#### 10 Infrared laser light-type continuous methane concentration measuring device ()

#### Measuring device that calculates methane concentration by measuring infrared absorption of methane gas

FY 2015 Society of Environmental Instrumentation, Control and Automation

#### (1) Optical fiber sensing box ()

#### Device that transmits data on the sewage level measured using

FY 2016 Society of Environmental Instrumentation, Control and Automation

### 12 Ecolo-guard construction method ()

#### Coating-type lining method for removing deteriorated parts of concrete structures and protection/repair of the concrete surface

FY 2018 Japan Sewage Works Association Encouragement Paper Award

### 01-01 Sewer maintenance service

Based on the division of roles with the Bureau of Sewerage, Tokyo Metropolitan Government, TGS is responsible for sewer pipe operation and maintenance services (branch services) at branch offices which the Bureau has established at one location in each of the 23 wards of Tokyo.

When a road caves in or flooding occurs, TGS works to prevent recurrence by using original maps created by this company. The results of these efforts are utilized in preventive maintenance-type facility operation and maintenance, such as measures for advance prevention of road cave-ins and other accidents.

At work sites, we develop and propose various innovative solutions. Feasible technologies based on excellent proposals are developed as new site-originated technologies. One example is the "Smart Catch inside drop pipe\*," which makes it possible to eliminate the outside drop pipes of manholes which had been one cause of road cave-ins.

In the future, we will continue to improve the guality of our services and operational efficiency by improving and increasing our efforts to date.

\*For details of "Smart Catch inside drop pipe", please refer to: https://www.tgs-sw.co.jp/business/technical/c01

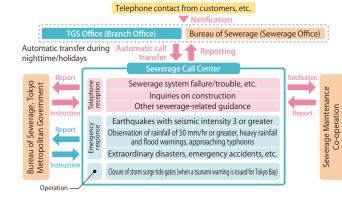
Table 1 Main sewer pipe operation and maintenance work under responsibility of TGS

	Content of work	
En	nergency response to road cave-in or sewer clogging, etc.	
	Coordination with road administrator and police	
Re	sponse to customer inquiries, complaints, etc.	
Re	pair work and operation (※)	
	Preparation of design documents for repair work, support for supervision of the work	
	Preparation of design documents for cleaning work and pipe inner investigation, support for supervision of the work	
	Preparation of design documents for public inlet installation	
Patrol and inspection		
Su	rvey work (surveys to check current condition)	
	In sewer lines, manholes, inlets	
W	itnessing work	
	Construction for road administrators and other companies	
Sa	fety management	
	Investigation of dangerous gases (e.g., $H_2S$ ) and accident prevention action	
	Re Re Pa Su	

% The Bureau of Sewerage, Tokyo Metropolitan Government performs the design work and construction supervision work.

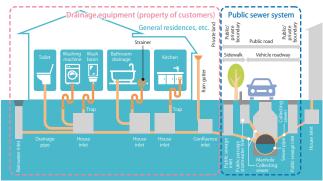
### 01-02 Night/holiday sewerage call center service

TGS has been entrusted with operation of the sewerage call center service during times (nighttime and holidays) when the Bureau of Sewerage, Tokyo Metropolitan Government is closed as a one-stop service that receives all telephone calls from customers, road administrators and others. Since this is a front-line service with direct contact with customers, we strive to respond guickly and appropriately in order to improve customer services.



#### 01–03 Inspections of private sewer-related services

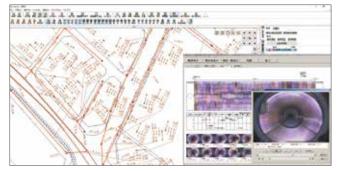
Private sewer-related facilities consist of drainage equipment such as "drainage pipes" and "house inlets" located on residential land space. These are important facilities that connect the customer to the public sewerage system. TGS provides inspection services at the actual site to check whether these private sewer facilities are properly constructed and maintained. At the site, inspections are conducted by TGS engineers with specialized knowledge and a deep understanding of construction technology.



## Supporting the development of Metropolitan Tokyo

#### 02-01 Sewerage Mapping and Information System (SEMIS)

TGS is responsible for functional improvement, maintenance management and data updating of the Sewerage Mapping and Information System (SEMIS) operated by the Bureau of Sewerage, Tokyo Metropolitan Government. We are contributing to stable operation of the sewerage system and improvement of sewerage services by properly managing the SEMIS system and making it possible to use a wide variety of data.



Screen of Sewerage Mapping and Information System

### 02-03 Sewer pipe design/estimation

TGS supports design and estimation work by the Bureau of Sewerage, Tokyo Metropolitan Government.

We also make functional improvements in the estimation system and are responsible for system operation and maintenance. In addition to utilizing telework and similar techniques, we are also improving work efficiency by using our own original system.





(core sampling survey)

that work.



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#### 02-02 Surveys of reconstruction projects

Because TGS is extremely familiar with the actual conditions at the site, we have been entrusted with inspection services for trunk sewer lines, sewage treatment plants and pumping stations which are scheduled for reconstruction. TGS prepares the drawings and other documents necessary for issuing reconstruction work orders, contributing to smooth implementation of reconstruction projects being carried out by the Bureau of Sewerage.



Survey for trunk sewer reconstruction



Survey for equipment reconstruction at sewage treatment plant and pumping station (survey of the current condition of electrical equipment)

#### 02-04 Supervision of sewer pipe construction

TGS provides construction supervision support for achievement of the targets set for reconstruction by the Bureau of Sewerage, Tokyo Metropolitan Government. We perform a variety of work related to construction safety and ensuring, beginning with technical guidance and coordination with contractors from the administrative viewpoint.

In Tokyo, sewer pipe reconstruction is being carried out targeting 700 ha/yr. TGS provides construction supervision support for approximately 70% of

In the future, we will work to further improve business operation by actively utilizing ICT and other innovative technologies with the aim of providing quick and appropriate service.



Construction supervision support work

## Effective utilization of resources and energy

#### 03-01 Maintenance management of sewage treatment plants and pumping stations

In the 23 wards of Tokyo, there are 13 sewage treatment plants that treat wastewater and 83 pumping stations for the related pumping.

To ensure stable operation of sewage treatment plants and pumping stations at all times, TGS performs maintenance management with priority to preventing equipment failures in advance.



Maintenance inspection work

Beginning in FY 2022, we were also entrusted with operation and maintenance services for some sewage treatment plants by the Bureau of Sewerage, Tokyo Metropolitan Government.

#### 03-03 Operation and maintenance of the optical fiber network

An optical fiber network, laid inside sewer pipes, links the sewerage facilities in the 23 wards of Tokyo. This network is used for remote monitoring and control of pumping stations from sewage treatment plants, etc. TGS has created a system for regular inspections of the optical fiber facilities and communications equipment, 24-hour monitoring of the operating condition of the network and quick response when problems occur.

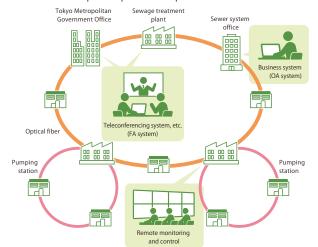


Diagram of the sewerage optical fiber network (image)

#### 03–02 Operation and maintenance of sludge treatment facilities

The sludge generated by the 13 sewage treatment plants in Tokyo's 23 wards is collected at 5 sludge treatment facilities, and its amount reaches as much as about 60 million m<sup>3</sup> each year. At the sludge treatment facilities, the physical volume of this huge amount of sewage sludge is reduced through the respective



Energy-efficient incinerator

processes of thickening, dewatering and incineration. We are also grappling with recycling of the ash that remains after the incineration process, for example, through effective utilization as a raw material for cement and as granularity controlled ash.

TGS performs operational and maintenance management of all five sludge treatment facilities and one sludge digestion facility.

As the sludge treatment process is extremely energy-intensive, it is important to reduce energy consumption and CO<sub>2</sub> emissions.

#### 03-04 Water quality testing/investigations

TGS performs water quality tests of water released from the sewage treatment plants to ensure that it meets water quality standards. From FY 2022, we were responsible for all water quality management work at some sewage treatment plants.

In sludge treatment, we confirm the properties of the sludge by sludge testing and reflect the results in daily optimum operation management. We also secure the stability and reliability of the supply of recycled water by accurate measurement of the treated water guality and precise operation management in the recycled water production process.

On the other hand, TGS not only performs regular testing, but also conducts more specialized investigations and research in order to solve problems in the field from a scientific standpoint



Water sampling in water treatment process



Water quality and related testing services

### 04-01 Supply of recycled water

Recycled water, which is produced by more advanced treatment processes of treated wastewater, is used as a valuable water resource that forms part of the water circulation system in Tokyo.

In the 23 wards of Tokyo, recycled water is supplied from three sewage treatment plants. TGS has been entrusted with this recycled water supply service, and is responsible for operation management and maintenance management at these recycled water

supply facilities.

Recycled water is effectively utilized as toilet water, etc. in approximately 200 facilities and is also used to restore clear streams in the 3 rivers in the Jonan area (Shibuya River/Furukawa River, Meguro River, Nomikawa River).



Seseragi-no-Sato Park

as possible.

#### Granularity controlled ash (Super Ash) business

using incineration ash as the raw material, and is engaged in a business that uses this product as a compounding agent for concrete. Super Ash is contributing to recycling of sludge, as it can be used as a raw material for the production of concrete secondary products such as Hume pipes, manholes, concrete segments, etc. which are used in public works construction in Tokyo.



e-CON

environment.

### 04-03 Construction surplus soil recycling

At the Nakagawa Construction-Generated Soil Improvement Plant, TGS operates a service that produces improved soil for use in backfilling from the surplus soil generated by sewerage construction. During the 32 years from the start of this service in 1988 to the end of FY 2019, the plant produced 3.55 million m<sup>3</sup> of improved soil.

After the plant opened, a complete renovation was carried out in 2003, but aging deterioration also progressed at the facilities that were started up after the renovation, and operation was suspended temporarily at the end of FY 2020.

At present, a new facility is under construction by the Bureau of Sewerage, Tokyo Metropolitan Government.



General view of the Nakagawa Construction-Generated Soil Improvement Plant



Production of improved soil



#### 04-02 Sludge recycling and use of renewable energy

The volume of sewage sludge as incineration ash is greatly reduced through the treatment processes of "thickening  $\rightarrow$  digestion  $\rightarrow$  dewatering  $\rightarrow$  incineration," and this incineration ash is recycled as a resource as much

The sewage treatment plants also generate electric power by utilizing the waste heat produced by sludge incineration and the energy of effluent drop (height difference) when the treated water is released.

TGS is responsible for some of the maintenance management work that enables stable, efficient operation of these businesses.

TGS developed a product called granularity controlled ash ("Super Ash")

(Super Ash)

Concrete secondary products

TGS jointly developed the new type of concrete e-CON, in which industrial byproducts such as blast furnace slag, fly ash, etc. and Super Ash are effectively utilized as a substitute for cement.

Since e-CON not only has excellent sulfuric acid corrosion resistance, but also reduces carbon dioxide (CO<sub>2</sub>) emissions in the production process by about 80%, use of this new product contributes to preservation of the global

Test body after immersion in 5% sulfuric acid aqueous solution for 112 days



e-CON



Ordinary cement

## Responding to issues at the site in Japan and other countries

#### 05-01 Technology development aimed at commercialization

TGS is conducting joint research with the Bureau of Sewerage, Tokyo Metropolitan Government and private companies on the theme of technology development directly linked to sewerage services. In addition, technology development themes are selected from among various issues that arise in the entrusted services performed by TGS, as part of active efforts to promote development of operation site-originated technologies. Together with aiming at practical application and commercialization of

the developed technologies, we are also working to continuously refine and improve technologies in cooperation with our development partners.



Developed technology (SPR construction method) Photo by RayShirao

#### 05-03 Contributing to the improvement of overseas project

Utilizing the strengths of technological capabilities and management know-how that TSG has cultivated until now, we are promoting international expansion of Tokyo-originated sewerage technologies. In Malaysia's Langat Sewerage Project, we provided technical support to Malaysian government agencies for all aspects of the sewerage system, through processes ranging from planning to design, construction and operation. This 12-year project was completed with no problems in November 2022.

In addition to participating in overseas sewerage projects based on

the needs of large metropolitan areas in other countries through collaboration/cooperation with the Bureau of Sewerage, Tokyo Metropolitan Government and Japan's national government and administrative agencies (JICA, etc.), we are also involved in technology exchanges though participation in international conferences and other activities.

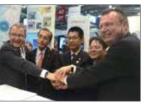


Hand-over ceremony of the Langat Sewerage Project (Malaysia)

#### 05-02 Domestic and overseas expansion of developed technologies

The technologies developed by TGS are contributing to problem-solving not only in the Tokyo sewerage system, but also in sewerage businesses in other parts of Japan and overseas.

In order to expand the use of TGS-developed technologies in Japan and other countries, it is necessary to win a high public evaluation for these technologies, and effective



Signing ceremony for a Memorandum of Understanding for joint development of TGS's water surface control device (Munich, Germany)

PR activities to encourage adoption are also required in addition to the proven record of Tokyo sewerage system. It is also important to respond to the conditions and thinking in other regions and countries, for example, the applicable technical standards in each area, and local business customs must be considered, especially in overseas countries.

We are making these efforts in collaboration with our joint development partners with the cooperation of construction method associations and other related parties.

#### 05-04 Support for Engineer Training and Study

Sewerage services in Tokyo are conducted by three organizations, the Bureau of Sewerage of the Tokyo Metropolitan Government, private-sector companies and TGS. In order to provide sewerage services consistently, it is important to ensure transmission of the technologies and know-how developed by these three organizations. TGS established the Sewerage Training Center in 2009 and began training Bureau of Sewerage staff and employees, and in 2013, we started the management and operation of training for private companies at the Sewerage Technology Training Center opened by the Bureau of Sewerage, thereby contributing to human resources development for the

three parties. To deepen the public understanding of the history of sewerage, TGS also conducts tours of the former main pump house of the Mikawashima Sewage Treatment Plant, which has been designated as an important cultural property. TGS has also been entrusted with gualification test and renewal course services for engineers responsible for private sewer works, including the nationwide Japan Sewage Works Association (JSA).



Practicing walking in water in a sewer pipe

For details on engineers responsible for sewer works, please refer to: https://www.tgs-sw.co.jp/haisui-enjineer/

## A foundation of human resources – People are the treasure

#### A diverse team of active colleagues

What supports the sewerage system in the Tokyo metropolitan area is the individual employees. Because TGS values the idea that "it is precisely people that are a company's asset (= treasure)," we work hard to hire and train human resources.

Our company, which aims is to achieve a sustainable society through the power of sewerage, is made up of diverse human resources who possess high technical capabilities and a strong sense of mission.

Employees in various types of jobs mutually cooperate to support the Tokyo sewerage system. These include the people in civil engineering, who are responsible for sewer maintenance service, the mechanical and electrical engineers who manage sewage treatment plant and sludge treatment facilities, environmental inspection personnel in charge of water quality management, and the business staff who are the management foundation of the company.



In addition to newly-graduated and hired young employees, we also have a number of veteran employees such as experienced persons from other companies, persons dispatched from the Tokyo Metropolitan Government and persons with administrative experience. Thus, employees with a wide range of ages are working together, taking full advantage of their respective technologies and experience.

With many of our veteran employees expected to retire in the coming years, we will look for people with spirit, who will protect the water environment and contribute to the safety and growth of Tokyo together with us

company dormitories.

their technical levels.

#### 02 A workplace where employees can shine

By providing a workplace environment where employees can continue to work vigorously and with a feeling of security and realizing diverse workstyles we aim to be a company where each employee can shine and all employees can work in mutual cooperation.

So that employees can maintain good physical and mental health and satisfy the balance of work and family life, TGS has established a vacation and leave system that includes 20 days of paid vacation each year, summer vacation, leave for personal events such as weddings and funerals, long continuous holidays, and time off for childbirth and child rearing, nursing care and care for elderly parents. We have also established a support system for a complete annual medical checkup and a mental health consultation system as efforts that consider a work-friendly environment and employee health, and we are expanding and improving our welfare and benefit program for younger employees, for example, by offering fully-furnished rental apartments in

The TGS career advancement system makes it possible for outstanding employees to rise to managerial positions at an early stage and supports the efforts of highly motivated employees who are eager to take on difficult challenges.

#### Training employees and self-study

With expanded hiring of young employees, the number with limited experience of sewerage in general is also increasing. To provide sewerage services consistently over the coming years, TGS works to ensure transmission of the technologies and know-how cultivated in the past reliably, to each individual employee, and to train the human resources that will support a sustainable society.

Beginning with new employee training and



Experiential-type actual site training

on-the-job (OJT) training by employees with a wealth of practical experience, we provide training in the 2nd and 3rd years after hiring, as well as training when employees are promoted to higher positions, giving employees opportunities to acquire knowledge corresponding to their careers.

In practical training, in addition to "desktop" exercises, we also conduct full-scale model training at the Sewerage Technology Training Center, and experiential-type actual site training using actual equipment and machinery. To support employees' desire for self-improvement, we offer financial support for those who wish to acquire sewerage-related qualifications such as sewage engineering or technology certifications, as well as in-house training and online training for acquiring gualifications, with the aim of improving