Technical Research & Development Promotion Plan -2016 (1/3)

1 Purpose

Bureau of Sewerage Tokyo Metropolitan Government will systematically engage in technological development for challenges that business face and issues to be solved with an eye to the future, and continue to lead Japan’s sewerage technology maintain and improve the sewerage services.

【Subtitle】 "Sewer technology that fosters future living and the environment"
The period of the Plan is 5 years from FY2016 to FY 2020.

2 The process of drawing up the Plan

We drew up the “Technical Research & Development Promotion Plan -2016” in order to solve technical problems surround sewerage works of Tokyo efficiently through technical development. This plan can assist to achieve the goals of "Management Plan 2016" and solve present technical problems at the site, as well as future problems based on social and economic situation, technology trends, and efforts by the national government and the Tokyo Metropolitan government.

3 Four efforts to efficiently technology development

1 Strengthen management ability of technology development
   - Various problems are occurring at the site on operation and maintenance. The leading edges of technologies such as IoT, ICT, artificial intelligence (AI) are appearing. We will utilize of these technologies.

2 Necessity of new ideas those aren’t technical extensions conventionally.
   - It is important to make technological innovation with new ideas to solve new problems those cannot be solved with technical extension conventionally.

3 Improvement of the environment for technology development
   - We are concerned about that technical development of sewerage industry is stagnant by reduced motivation of private enterprises and others for technology development in the severe economic conditions.

4 Enhance opportunities for improving technical capabilities
   - It is important to fully understand sewerage facilities and technology, because we must introduce complex sewerage technology while operating sewerage facilities.

1 Utilization of MOT (management of technology) method
   - We will newly utilize MOT (management of technology) method in order to comprehensively manage setting development theme through commercialization in the PDCA cycle.

2 Promotion of open innovation
   - We will further promote “open innovation” to create and develop innovative technologies and ideas that can be utilized for sewerage projects.

3 Activation joint research
   - We will further activate joint research by promoting “Joint research on the premise of introducing development technology” etc. to increase the motivation for technology research.

4 Improvement of technical capabilities of sewerage industry
   - We will improve the technical capabilities of the sewerage industry by ensuring the succession of sewage technology and conducting joint research to improve technical capabilities of private enterprises and others.
4 Development theme to be addressed within the plan period

We conducted a questionnaire survey on officials such as on-site and young officials on the development theme, and selected 53 themes. It is classified by measures such as reconstruction technology, flood control technology, earthquake disaster countermeasure technology.

[A viewpoint to solve problems]
- In order to develop the leading edge of technologies, we will utilize IoT, ICT (Information and Communication Technology) including Artificial Intelligence (AI) and others.
- In order to secure sewerage functions stably in the future, we will enrich development related to operation and management technology.

5 PDCA cycle of technology development

- By conducting management from the viewpoint of "visualization" of technology development and the PDCA cycle, we will promote technological development more effectively.

**Plan** Setting development theme
- Understanding needs, discovering technical seeds, setting development themes

**Do** Implementation of Inherent research Joint research etc.
- Implementation of inherent research (such as in-house research or consultant research, etc.)
- Implementation of joint research (Publicly offered joint research, know-how + field offered type joint research, short-term joint research)
- Implementation of new construction method, testing and construction of new materials and new equipment, performance check etc.

**Check** Technology evaluation
- Technical evaluation, evaluation on practical application, ex-post evaluation

**Action** Announcement of developed technology and improvement
- Announcement of developed technology, introduction, fined problems and improvement
6 Examples of development themes

Technological development to ensure customers’ safety and support customer’s security and comfortable lives

(1) Operation and maintenance technology
- Technology that can easily inspect and clean the deep sewerage pipe

(Issues)
- It is difficult for people to inspect or clean deep and long sewerage pipes.

(Measures)
- We will develop technology to make work of sewage pipes of large depths unmanned and labor saving by utilizing robots etc.

Image to clean the deep sewage pipe with robots

(2) Earthquake countermeasure technology
- Rehabilitation method for suppressing cross-sectional reduction and improving earthquake resistance of sewerage pipes

(Issues)
- When earthquake-resistant by the rehabilitation method (spiral wound lining method), the cross section is reduced and the necessary falling capacity cannot be secured in some cases

(Measures)
- We will develop and introduce technology to improve earthquake resistance performance and falling capacity, by combining reinforcing material with rehabilitation method,

Image of rehabilitation method combined reinforcement material

Technology development to make a good water environment and a city with less environmental impact

(3) Energy・Global warming countermeasure technology
- Technology that further promotes energy generation and conservation by utilizing more incineration waste heat

(Issues)
- In order to cope with increasing energy consumption, it is required to expand the use of renewable energy and further promote energy conservation.

(Measures)
- We will develop technology to capable of covering necessary electricity at sewage facilities by generating electricity more effectively utilizing waste heat at incineration of sludge

Image of expand utilization of renewable energy

(4) Water treatment technology
- Technology that combines water quality improvement and energy saving using control system utilizing ASM and new sensors

(Issues)
- New water treatment technologies that compatible with water quality improvement and energy saving are required.

(Measures)
- We will develop technology to calculate and control the optimal air flow rate and good water quality in real time by computer system using measured water quality and other data.

Image of control technology utilizing ASM*

*ASM: activated sludge model