
How to Advance Management of Technical Development -Sewerage Systems Engineering Vision and Conference on Technical Development of Sewerage Systems-

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1. Introduction

Water Quality Control Department of NILIM considers that stock management for sewer pipes is one of the current issues with top priority, which includes development of efficient inspection techniques for aging and deteriorating sewer pipes, and has been addressing main issues including urban inundation countermeasures, earthquake countermeasures, risk management, global warming, and energy saving / creation. On the other hand, for technical development as a national institution, we have been playing a certain role, such as formulation of the "Five-year technical development plan for sewerage system" three times including the plan of former Public Works Research Institute. In recent years, we have formulated and published "Sewerage Systems Engineering Vision (Dec. 2015)" based on "New Sewerage Systems Vision (July 2014)" and "Sewerage Policy for New Age (Report of the Panel on Infrastructure Development, Feb. 2015)", and established "Conference on Technical Development of Sewerage Systems" in January 2016. In addition, we have been implementing the contract research since 2011 concerning the Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH Project). This paper describes the trend of management for such technical development of sewerage systems as mention.

2. Sewerage Systems Engineering Vision

New Sewerage Systems Engineering Vision is based on the continuation and advancement of "Routes of Circulation" and provides the direction for solving issues in the form of a long-term vision and a medium-term objective over about 10 years after organizing the present circumstances and issues on sewerage systems.

In the Sewerage Systems Engineering Vision, technical development necessary to achieve this medium-term target was organized into 11 technical development fields as specified in Table 1.

The core of the Sewerage Systems Engineering Vision is the road map prepared for each technical development field. The road map consists of the issues in achieving the medium-term objective of New Sewerage Systems Engineering Vision and the technical objective for solving the issues. This technical objective is classified into three steps

according to the timeline, i.e., technical objective for the present (5 years ahead), medium-term technical objective (10 years ahead), and future technical objective (about 20 years ahead), and technical development items reflecting the specific content of technical development are determined for each step. Further, in the technical development items, technical development is classified into three types of study, i.e., basic, applied, and empirical studies.

Table 1: 11 technical development fields

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| (i) Sustainable sewerage system (reconstruction) |
| (ii) Sustainable sewerage system (rehabilitation, response to deterioration, smart operation) |
| (iii) Measures against earthquake / tsunami |
| (iv) Rainwater control (inundation measures) |
| (v) Rainwater control (rainwater use, measures for water from unknown source, etc.) |
| (vi) Basin zone control |
| (vii) Risk management |
| (viii) Reclaimed water use |
| (ix) Local biomass |
| (x) Energy creation / renewable energy |
| (xi) Low-carbon sewerage system |

In systematization of the technical development fields, various viewpoints were considered. For this Sewerage Systems Engineering Vision, we determined the above-mentioned 11 fields in reference to the classification of sewerage-related organizations and study subjects in NILIM and PWRI. Of these 11 fields, Wastewater System Division is taking charge of (i) and (ii), Wastewater and Sludge Management Division, (viii) and (xi), Research Coordinators for Wastewater System Restoration, (iii), and Research Coordinators for Water Quality Control, (iv) and (v), and the road map was created with cooperation of the institutions concerned including PWRI.

We are going to follow up on the Vision in the Conference on Technical Development of Sewerage Systems to be described below by grasping the opportunity of reviewing the medium-term objective according to the revision of New Sewerage Systems Engineering Vision and the current trend of technical needs and seeds.

3. Conference on Technical Development of Sewerage Systems

In order to follow up on the Sewerage Systems Engineering Vision and discuss desirable technical development, we established the Conference on Technical Development of Sewerage Systems, which consists of the persons concerned in industry, academia and government. As an activity of the Conference, we conducted a questionnaire survey, etc. to grasp technical needs and seeds. Based on the results of this survey, of the technical objectives provided in the road map of the Sewerage Systems Engineering Vision, we selected and published the seven items specified in Table 2 in July 2016 as the critical issues of the road map (issues that should be solved with focus on research and development, etc.). We also published the results of our activity in February 2017 as "2016 Report on Sewerage Systems Engineering Development." Of the critical issues of the road map, for example, in "Technologies for acceleration and cost reduction of facility management," technology for conducting a pipeline survey at a speed 5-10 times faster, substitution of difficult maintenance work with a robot, detection of abnormalities in the facility using ICT, technology for inspection / rehabilitation for locations hard to survey, etc. are mentioned as examples of promising technologies. These technical visions are used to show the direction of technical development, as shown by the adoption of new theme for B-DASH based on the critical issues of the road map.

The issues that came to surface through activity are organized as follows.

- (i) Grasp and transmission of technical needs and seeds
- (ii) Bridge with needs and seeds
- (iii) Sharing of technical information of the government, etc.
- (iv) Support of local technical development / introduction
- (v) Posting of the strategy / policy of technical development

For (i), (ii), and (iii), sharing of collected information and cooperation with various organizations and conferences should be further promoted. For (iv), particularly, review of common technical issues among small-and-medium cities and common research / technology should be considered.

Table 2: Critical issues of road map

(Short- to medium-term issues)
- Technical development for acceleration / cost reduction of facility management, etc. (ii)
- Technology for utilizing local biomass in sewerage (ix)
- Technology for reducing energy consumption in sewerage about 10% (xi)
(Medium- to long-term issues)
- Earthquake resistant measure method for a large-scale earthquake and priority evaluation method (iii)
- Grasp of the status of water from unknown source, impact assessment, and establishment of effective countermeasures (v)
- Control of pathogenic microbes, pathogenic microbe detection / monitoring system (vii)
- Collection of useful resources, such as phosphorus, and fertilizing of sewage ash (ix)
* Parenthesized numbers correspond to the numbers of the road map of Sewerage Systems Engineering

4. Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH)

We have engaged in 43 contract researches until fiscal 2016 and established 16 guidelines for dissemination and development of demonstrated technology. In the future, we need to follow up on demonstrated technologies and guidelines and address issues including systematization of demonstrated technologies.

5. Conclusion

If technical development management is compared to a play, the script (Sewerage Systems Engineering Vision) and the stage (Conference on Technical Development of Sewerage Systems) have been prepared. As a director and actor, NILIM would like to demonstrate the maximum performance, while sometimes giving advice to the script and stage.

☞ See the following for details.

- 1) New Sewerage Systems Engineering Vision
http://www.mlit.go.jp/report/press/mizukokudo13_hh_000250.html
- 2) Sewerage Systems Engineering Vision
<http://www.nilim.go.jp/lab/eag/h271204gijyutsuvison.html>
- 3) Conference on Technical Development of Sewerage Systems
<http://www.nilim.go.jp/lab/eag/gesuidougijyutsukaihatsukai1.html>
- 4) Breakthrough by Dynamic Approach in Sewage High Technology Project
<http://www.nilim.go.jp/lab/ebg/b-dash.html>
<http://www.nilim.go.jp/lab/ecg/bdash/bdash.htm>