Improving Sustainable Maintenance Methods Considering Risk Management

KOHASHI Hidetoshi, (Dr. Eng.)
Research Center for Land and Construction Management
YAMAGUCHI Tatsuya, Head, SUGITA Yasutoshi, Senior Researcher
KONO Susumu, Researcher
Research Coordinator for Construction Management
Construction System Division

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1. Introduction

Aware that the deterioration of public infrastructure is now a serious problem, we are enacting plans to extend the service lifetimes of all types of public infrastructure, and carrying out concrete studies of management methods including inspections, measures, and databases. In the future, management techniques to determine how to incorporate execution methods in maintenance work, how to sustainably conduct the PDCA cycle, and how to prevent fatal risk to managed facilities must be found. The NILIM started "Research on methods of improving the sustainability of maintenance incorporating the perspective of risk management": a two year project started in 2014 to incorporate this resolution method. Beginning in April 2014, to horizontally integrate research activities, the Maintenance Research Promotion Headquarters was inaugurated with four missions. This research is being undertaken positioned as one of these missions: "Clarifying problems obstructing the maintenance PDCA cycle and resolution derivation methods".

2. Method of conducting the research

This research will be conducted in the following steps [1] to [5].

[1] Categorizing the present state of and problems with maintenance in the public capital field.

[2] Understanding the essentially different characteristics of each field (purpose of installing objects of maintenance, maintenance systems, reliability of technologies used, etc.) to compare their problem points.

[3] Sharing maintenance work between fields and setting evaluation axes thought to aim for the essential character of problems.

[4] Improving the completeness of evaluation axes that are insufficient or thought to need improvement while referring to private sector infrastructure field or overseas efforts.

[5] Performing verifications using case studies and evaluating methods of conducting maintenance (management) to propose a framework useful in proposing improvement measures.

3. Evaluation axis common to maintenance in various fields

In order to build an evaluation framework enabling managing bodies to conduct self inspections of their management method and obtain suggestions for improvement measures, we visited four managers of road bridges, river levees and revetments, and sewage mains (road and river offices of the Ministry of Land, Infrastructure, Transport and Tourism, sewage bureaus of ordinance-designated cities), six private sector companies (railway, gas, manufacturing, plants, housing) and countries overseas (road and river managers in England and France) to conduct interviews about problems they face and episodes they have experienced. Based on these, we considered evaluation axes from the following perspectives.

1) Being confronted with regular accidents, troubles, and natural disasters endangers management of deterioration of facilities. Attitudes to response measure according to characteristics of risk (prolonging lifetime by renewal or repair?, prediction or post-trouble response?, priority on disaster prevention or safety measure?, prioritizing precision or speed?).

2) Problems obstructing sustainability are encountered in all processes: inspecting, evaluating soundness, predicting deterioration, taking countermeasures or using databases. Ideas for linking with other tasks to draw out effectiveness of improvements to problems from their interrelationships (for example, cleaning and inspections, earthquake damage investigations and soundness evaluations, disaster prevention measures work and repair measures work, etc.)

3) Converting and developing concepts, such as searching for clues to resolution of problems in each process in other processes (for example, finding methods of using databases to screen the efficiency of inspections, finding knowledge of deterioration prediction in dismantled works.

4. Future Plans

In FY2015, we will move ahead to [4] and [5] in "2. How to proceed with research" and summarize the results.