Development of Maintenance Engineers for Road Structures in Cooperation with Regional Development Bureaus, Etc.

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1. Introduction

The NILIM regards onsite support for the improvement of technical expertise of the Regional Development Bureaus, etc. (hereinafter called the "RDB") as one of the fundamental functions, together with research and development to support the planning, drafting, and propagation of technical policies of the Ministry of Land, Infrastructure, Transport and Tourism. In addition, an important role as an organization is developing regional core engineers by recruiting and training human resources who have both administrative knowledge and expertise, and transferring technical expertise through guidance and advice. This can only be accomplished by those who hold positions where they acquire knowledge about practical work and challenges faced at the site.

In this report, activities carried out by the Road Structures Department in cooperation with the RDB, and other related organizations will be presented, from the viewpoint of developing onsite technical expertise of maintenance engineers for road structures who play a core role in the regions.

2. Cooperation with the Regional Development Bureaus, etc. for the purpose of developing human resources

Figure-1 shows the efforts of the Road Structures Department in cooperation with the RDB in an effort to develop maintenance engineers for road structures who play a core role in the regions.

The 1st initiative is to accept technical staff of the RDB in the NILIM. This effort was started in FY2015, and 38 staffers of the RDB (hereinafter called the "staff on loan from the RDB") were accepted by FY2024. The staff on loan from the RDB are engaged in research work as the positions of staff of the NILIM, and are involved in research related to the revision, etc. of the technical standards for road structures. Furthermore, brush-up of technical expertise is pursued while accumulating experiences through OJT, concerning support for training to be provided by the RDB and technical support, etc. in the case of occurrence of damage caused to road structures due to a disaster or defect as well.

The 2nd initiative is to strengthen cooperation with the Road Maintenance Centers established in the Regional Development Bureaus. The Road Structures Department carries out investigations into defects in road structures, in each region, in an effort to ascertain the defect and cause of the damage. It works in cooperation with the Road Maintenance Center, while at the same time carrying out activities such as the investigation of problems related to the management of technical standards.

The Department is making progress, while developing engineers familiar with technical standards who play a core role in regions through these initiatives, resulting in technical knowledge about the maintenance of road structures that will be gathered in the RDB.

3. Development through research on the technical standards for regular inspection

With the occurrence in December 2012 of an accident of ceiling plate collapse in the Sasago Tunnel on the Chuo Expressway, relevant laws and regulations as well as cabinet and ministerial orders were amended in 2013, and in 2014 regular inspection of once every 5 years was obligated for road structures such as tunnels and bridges. After a period of 10 years, the "Regular Inspection Procedures" were reviewed in March 2024 at which time the results of two rounds of inspections were summarized.

At the time of this review, the data of the regular inspection until the present was analyzed objectively, and after having clarified the technical problems for achieving both the improvement of inspection/ diagnosis qualities and labor saving, a study of solutions of such problems was conducted. The staff on loan from the RDB have access to technical knowledge about the mechanisms of deterioration of and damage to road structures and the advancement of such deterioration or damage through data analysis, etc. in

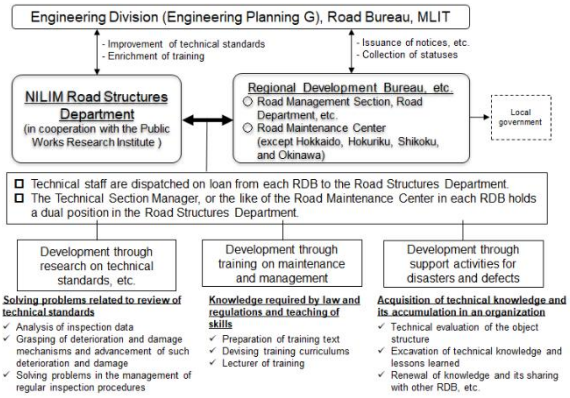

Figure-1 Cooperation with the RDB, for the development of engineers who play a core role

the process of engaging in the study work for this review, and put into practice the thought for the solution

of technical problems such as the improvement of diagnosis qualities. Moreover, the staff will also learn the true nature of technical measures through studying the review to ascertain what direction the inspection and diagnosis of road structures should be guided. These are important elements from the perspective of developing engineers who will play a core role in various regions.

4. Development through training on maintenance and management

With regard to road bridges, the results of regular inspection of management by the national government in all over Japan that have been accumulated until the present have been analyzed, and training text has been prepared consisting of examples of road bridge structure, design, construction, and damage as well as their mechanisms, methods of grasping the condition at the site and precautions, the concept of diagnosis considering progressiveness based on the roles and damage condition of members, etc. In addition, regarding the curriculum of training as well, contrivances have also been made to improve the quality of inspection, by incorporating practical training so that the assessment and findings of diagnosis can be learnt logically and systematically, and at the same time by performing site practical learning and by taking measures such as the introduction of an examination in which the findings of diagnosis of a bridge that has been checked visually in its vicinity.

In addition to what is listed above, training on the maintenance and management of road bridges includes the following training calibrated according to the number of years of experience.

- Training with the intent of acquiring basic knowledge that is necessary for the design of repair, and the implementation and supervision of construction
- Training intended to acquire knowledge about management including the planning, design and construction of repair on the basis of the technical standards regarding design and inspection
- Training intended to acquire knowledge about management including emergency response to recovery when damage occurs due to deterioration or a disaster.

Also, regarding tunnels as well, the RDB, etc. carries out training intended to acquire knowledge that is required when determining the classes of diagnosis of soundness in regular inspection, such as a study of technical evaluation based on the grasping of the conditions. In these types of training, staff on loan from the RDB prepare a curriculum plan and training text, or provide support for the RDB, as a lecturer, thereby making strategic efforts to develop human resources as engineers in charge of road management.

5. Development through support activities for disasters and defects

The Road Structures Department provides technical advice on various technical challenges faced at site by a road administrator, while utilizing thorough knowledge of technical standards and findings, that have been obtained through response to various conditions in the past. When damage has been caused to a road structure due to a disaster or defect, specialty staff are dispatched immediately upon request from the road administrator. Many things can be learned precisely in such a time. Because of that, on occasions when staff are dispatched to a site, staff on loan from the RDB are dispatched to accompany the specialty staff, and they are able to carry out an investigation jointly with the Road Maintenance Center in the region. That is one way that we are making efforts to provide technical advice for the requester regarding first-aid measures, as well as comprehensively based technical evaluation of such things as the performance of a road structure in the current situation and changes expected to occur hereafter, as well as location conditions and environmental conditions, and other unique conditions.

In addition, it is also important to summarize knowledge obtained through the findings of the technical support, and to share the knowledge with the Road Maintenance Centers all over Japan. The Road Structures Department shares the content of technical support provided to the road administrator through regular meetings with the RDB and Road Maintenance Centers, and at the same time exchanges opinions about points of further improvement regarding the content of technical advice. We also bring examples of damage to actual road bridges, and carry out technical evaluation on the performance of such bridges and as to how such performance may change hereafter, and engage in exchange of opinions as well, regarding the grounds related to the determination of soundness diagnosis classes, such as the policy of measures to be taken by the next time inspection as the road administrator.

6. Conclusion

Since the number of engineers involved in the maintenance and management of infrastructure facilities will decrease in the future, the importance of developing road structure maintenance engineers will further increase, who will be the motive power to efficiently turn the management cycles of road structures. We would like to make efforts in the support toward the improvement of technical expertise of the RDB, while continually seeking cooperation with the RDB.

☞For more detailed information, visit:

1) Civil Engineering Technical Material Vol.67, No.1 pp.46-49