Technical Support for Frequently Occurring Road Disasters

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1. Introduction

The Fifth Priority Plan for Infrastructure Development, which was adopted by a cabinet decision in May 2021, listed "realizing a disaster prevention/mitigation-focused society" as a priority target and presented "mitigating risks for earthquakes, tsunami, and other imminent disasters" and "ensuring transportation availability during disasters" as a policy package aimed at achieving this target. The plan lists deepening infrastructure through "Full forces" as initiatives to achieve the target. Full forces refer to entity, means, and the time axis; from the perspective of concerted efforts by entities, the plan promotes measures through strengthened coordination between the national government and local governments.

The Road Structures Department offers technical support for disasters affecting roads, including those managed by local governments; below is presented a case example of recently occurring damage from torrential rain that demonstrates the disaster response (investigation of causes, stopgap recovery efforts) and the initiatives to make use of the findings obtained from it in preventing disasters from recurring.

2. Support for disaster response

Figure 1 shows NILIM's technical support and research activities in disaster response. The balloons with red writing at each item show concrete technical support provided by our department and the blue frames show our department's research activities. Dispatching experts to disaster-affected locations, establishing advisory committees as necessary, and investigating and inspecting similar locations are efforts that should be anticipated immediately after disasters occur.

(1) Support for on-site investigations and recovery efforts at disaster-affected locations

When a road disaster occurs, we dispatch experts in the bridge, tunnel, and earthworks sectors in response to requests from local government, as well as from regional development bureaus, and provide technical advice for cause investigations and emergency recovery efforts.

We dispatched experts to disaster-affected locations again in FY2021, as shown in the close-up at the beginning of this issue.[1)] When doing so, NILIM often teams up with the Public Works Research Institute to dispatch personnel, and they are accompanied by employees from the development bureau with jurisdiction.

(2) Initiatives to make use of lessons from disasters

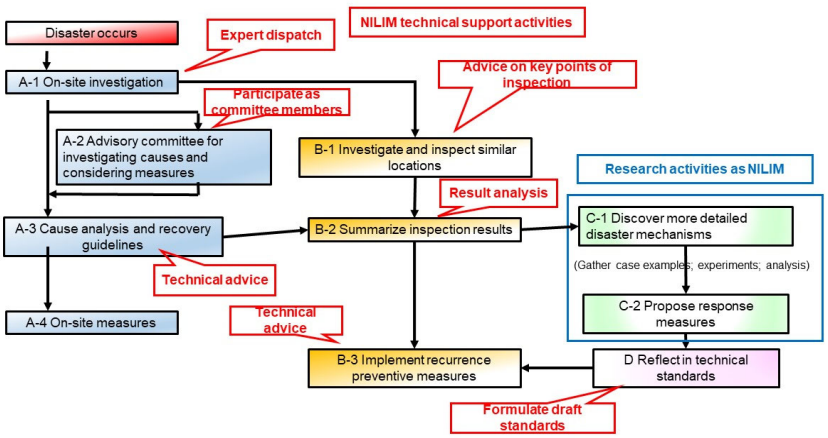

Fig. 1. NILIM's technical support and research activities in disaster response

Initiatives to investigate factors in the occurrence of disasters and to connect these to preventing further disasters are also important. For this reason, we provide technical advice aimed at investigating and inspecting locations with conditions similar to the disaster-affected location and prevent further disasters from occurring.

In addition, when a detailed analysis of the disaster mechanism is necessary, we bring it up as a research topic, propose response measures through collecting case examples of disasters and conducting simulations and experiments, and reflect these in technical standards.

(3) Examples of specific initiatives

A bridge was closed to traffic for a long time due to scouring of its foundations in the 2019 East Japan typhoon. In response, we conducted research on the topic of "extracting road bridges likely to suffer scouring damage," looking at methods of finding road bridges with a high risk of being affected by disaster and methods of increasing the options for preventive measures and reducing the risk of being affected by disaster, with the aim of proposing reasonable preventive measures against the above disaster.[2)]

While conducting the above research, we also analyzed cases of disasters from recent years and extracted points to note during inspections. In August 2021, we organized the outcomes into training materials titled "Preliminary knowledge on scouring in road bridge maintenance (draft),"[3)] so that it could be widely known among engineers involved in road bridge inspections. This document is used in training for regional development bureau and local government employees (Fig. 2).

In addition, we are also researching effective methods in locations requiring measures to control scouring. In some cases, bridge piers have sunk or collapsed near locations where streambed protection has been installed with the objective of preventing scouring on the streambed due to flowing water. Given this, to test the possibility of the flow accelerating and local scouring occurring more readily around bridge piers adjacent to streambed protection, we built a 1:30 scale model of a bridge confirmed to have suffered pier sinking and inclination due to scouring from torrential rain in July 2020. We conducted hydraulic model experiments focusing on the scope of the streambed protection installation, whether there was a ground sill, and the distance between the ground sill and the bridge, and we measured and observed water levels, flow speed, streambed height, etc. (Photo)

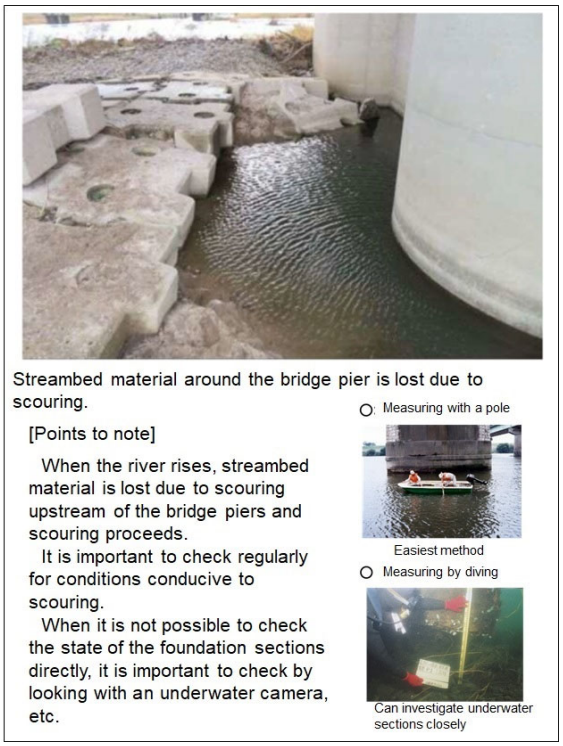

Fig. 2. Example of preliminary knowledge about scouring

Photo. Experiment on scouring around streambed protection

3. Conclusion

The Road Structures Department provides support for technical aspects of sites and policy for road disasters, such as on-site investigations, formulating recovery guidelines, recurrence prevention measures, and reflecting these in technical standards, and we hope to continue to play this role.

☞See here for detailed information

1) *Rapid Technical Support for Disasters and Faults*, p. 9 herein

2) *Development of Methods for Determining Disaster Potential and Preventive Measures for Bridge Washouts and Scouring*, p. 61 herein

3) *Preliminary knowledge on scouring in road bridge maintenance*

http://www.nilim.go.jp/lab/ubg/reference/pdf/21BR005/20210831_bridge_scour.pdf