

This column presents a case where Iwate Galaxy Railway Co., Ltd. took the measures using the “Support for project cost for general safety measures for railway facilities” to respond to heavy rains that have become more frequent and severer in recent years. The company has installed new riverbed protection blocks and new scouring detectors as the measures against scouring of bridges with the aim of improving the safety of railway passengers and preventing bridges from being washed out or inclined by heavy rains. We interviewed with Iwate Galaxy Railway Co., Ltd. about the details of this project and the procedures for the subsidy.

【Interview with Iwate Galaxy Railway Co., Ltd.】

In the upstream and downstream sides of No.4 Kitakami River bridge, the river width was widened by the river improvement works carried out in the past. However, the river width was reduced near the concerned bridge compared to the upstream and downstream sides, because the position of the bridge abutment has not been changed. Therefore, the flow velocity near the bridge accelerates when the water level rises, and the riverbed has lowered. As a result of conducting the overall and individual inspections of the concerned bridge, the riverbed lowering near the bridge pier as well as partial scouring of the bridge abutment were observed. It was found out that reinforcement works are necessary.



Figure 17: No.4 Kitakami River Bridge
(Full view from the upstream side)



Figure 18: No.4 Kitakami River Bridge
(Full view from the downstream side)

Moreover, the riverbed has lowered at No.8 and No.10 Mabechi River bridges from the time when they were constructed. Therefore, riverbed protection blocks were newly installed at No.8 Mabechi River bridge (FY2013) and at No.10 Mabechi River bridge (FY2016) to control the riverbed lowering. Since then, as a result of conducting the overall and individual inspections of both bridges, it was confirmed that there is no problem in their soundness. However, there was a risk that the bridge piers are washed out or inclined due to insufficient embedment caused by the riverbed lowering when the river level rises. Therefore, it was necessary to examine a possibility of introducing inclination detection devices (See Figure 25).



Figure 19: No.8 Mabechi River Bridge (Full view from the downstream side)



Figure 20: No.10 Mabechi River Bridge
(Full view from the downstream side)

It was found out, based on the above information, that it is necessary to take measures to prevent wash-out and inclination of the bridge due to heavy rains (3 parts of the bridge). The project was carried out using the “Support for project cost for general safety measures for railway facilities”. The details of the project are as follows;

Construction work to install new riverbed protection blocks at No.4 Kitakami River bridge

When selecting a construction technique, riverbed protection blocks were selected taking into account the nearby environment, because the work can be done in a narrow space, these blocks can prevent bridge piers and abutments from being washed out and the riverbed from being lowered, and the company has an experience in this construction technique. Since the bridge piers and newly-installed concrete riverbed protection blocks have been connected, a possibility of wash-out decreases significantly. In addition, the scouring and riverbed lowering are prevented by covering the entire river width with these new blocks.



Figure 21: Installation of new riverbed protection blocks (completion of concrete placement)



Figure 22: Completion of work (Full view)



Figure 23: Completion of work (riverbed bottom)

Installation of new scouring detection devices at No.8 and No.10 Mabechi River bridges

Since the devices capable of automatically transmitting observational data from inclinometers on-line have been installed, it is now possible to check data on a real-time basis and efficiently control operations. Moreover, it is now possible to check the stability of bridge piers with the inclinometers when resuming the train operation after it has been restricted (stopped) due to the rise in water levels. In addition, it is possible to view data on restrictions and disasters in the past.

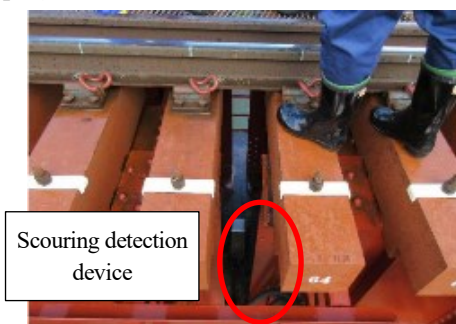


Figure 24: No.10 Mabechi River bridge (work completed)

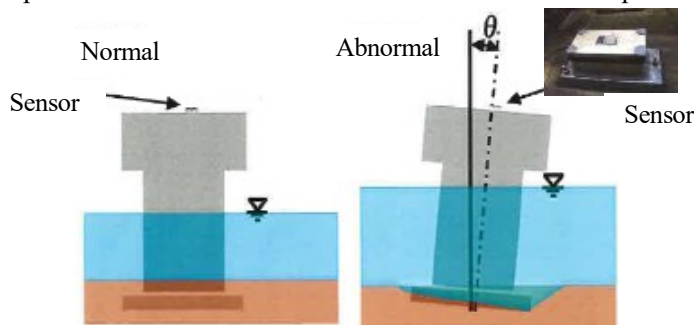


Figure 25: System to detect a bridge pier inclination with a scouring detection device

The above measures have resulted in preventive preservation to prevent accidents due to heavy rains.

It was difficult to prepare documents related to the construction works and contracts for the subsidy examination process, since the works started at the end of the fiscal year. However, the procedure for applying for the subsidy completed without problems.

We expect that accidents caused by heavy rains are prevented by considering a possibility of using the subsidy for reinforcement of bridges (wash-out preventive measures) and the installation of scouring detection devices.

[Subsidy used by Iwate Galaxy Railway Co., Ltd.]

Support for project cost for general safety measures for railway facilities, project to take measures against heavy rains

- To support the reinforcement of bases of bridge piers/abutments, the rehabilitation of bridges, and the introduction of abnormality detection systems to prevent railway river bridges from being washed out or inclined due to heavy rains.
 ※ The subsidy is applicable to bridges on routes where the one-way passenger volume is more than 10,000 and less than 150,000 per day or routes where higher category trains or cargo trains operate.