

For Realization of New Road Vision

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key words: road structures, maintenance, disaster prevention / mitigation, new technology utilization

1. New road vision

In February 2020, the Basic Policy Group of the Road Subcommittee of the Panel on Infrastructure Development deliberated a proposal of a new vision¹⁾. The previous road policy vision of Japan had been established in 2002. It was titled "In 2040, Road Scenery will Change -- To roads leading to people's happiness --" and provided three images of society that the road administration aimed to achieve. This paper introduces the activities for realizing such society by the Road Structures Department in 2020.

2. Roads for protecting people and livelihoods from disasters and climate change

Following the natural disasters that occurred in Japan in 2019, including the Boso Peninsula Typhoon and the East Japan Typhoon, some roads remained impassible for long periods of time, although they were designated as part of the primary highway freight network, due mainly to scouring of bridge foundations and collapsed earthworks and natural slopes (see the below photo).

In response to the intensifying and growing threat of recent disasters, the proposed vision states that "Disaster-resilient highway networks shall ensure the movement of people and goods to affected areas without stoppage and minimize the loss of human life and damage to the economy."

It is important to build a system for properly managing the risks of road structures according to the performance required of the said route.



Photo: Hounji Bridge on National Highway No. 20 where subsidence of the bridge pier occurred

NILIM focuses research on (i) improving disaster prevention capacity by advancing technical standards for new construction, (ii) devising preliminary measures for potential risk reduction and disaster mitigation of existing infrastructure, (iii) grasping the extent of damage in order to ensure system in the event of a disaster, and (iv) technologies for road sweeping, emergency recovery, disaster recurrence prevention, etc. It then aims to subsequently reflect the results of these studies in supportive measures and implementation in the field.

In studying these issues, the Road Structures Department uses its organizational abilities to link the performance of individual structures to the service level of individual routes that constitute the road network, and organize standards into specific review standards for managing the disaster prevention measures of those structures (Fig. 1). In such process, we will aim that disaster-resistant performance of roads can be reasonably "visualized" in order to propose measures to improve disaster-resistant performance of roads in an easy-to-understand manner to people.

In order to enable information-gathering activities in a disaster, NILIM promotes, in cooperation with road administrators, research and demonstrations of technologies for grasping the scale of damage and road accessibility in the event of a disaster using unmanned / manned aircraft, information on severed optical cables, and strong earthquake monitoring information.

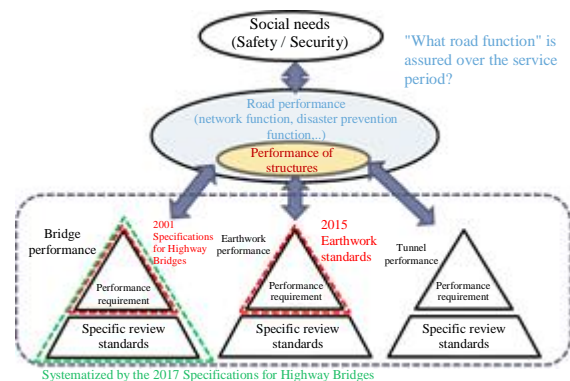


Fig. 1 Development of standards based on road performance

3. Extension of the life of road network

Due to rapid deterioration, it is necessary to systematically maintain road structures at the minimum life-cycle cost. Since FY2014, it has been required by law to inspect road structures every five years, the first round of inspections having been completed in FY2018. The second round of inspections that started in FY2019 feature a streamlined procedure that is based on the results of the first round of inspections and efficiency-enhanced through the introduction of new technologies. As such, the proposed vision states that "Road networks shall function without interruption by introducing new technologies that enable efficient and advanced preventive maintenance."

NILIM has cooperated in the preparation of information concerning the aforementioned inspection procedure, and the introduction of new technologies. It will continue to conduct studies into ways to improve the reliability and efficiency of inspections through comparative analysis of the results of the first and second rounds of inspections, and promote research into quality assurance / improvement measures of inspections and diagnoses that should be reflected in the revision of the statutory inspection procedure for the third round of inspections, labor-saving measures, and measures for streamlining inspections under various conditions.

Because of the inspections, structures that require repair or reinforcement are also being identified. In pursuit of reasonable actions, the department continues to study the introduction of partial factor / limit state design methods into the repair / reinforcement of road bridges, as well as the survey / design method for eliminating early deterioration of pavement sections.

The department also conducts studies into common management methods for road structures by fully utilizing the results of statutory inspections and maintenance information from Regional Development Bureaus, in order to efficiently and effectively manage assets across the country.

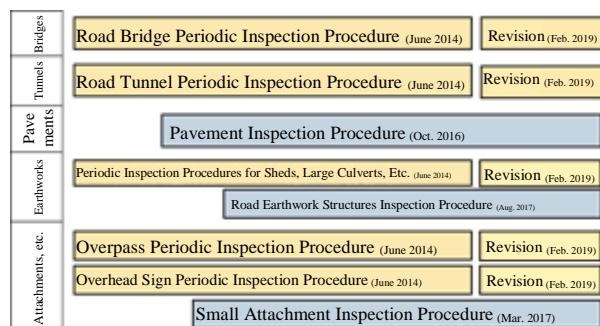


Fig. 2 Formulation of periodic inspection procedures for road structures

4. Development and utilization of new technologies

In reference to the development and utilization of new technologies as one of the challenges for advancing the foregoing road measures, the proposed vision states that "For the development and utilization of new technologies, the central government needs to promote open innovation and shift to a mindset of active utilization of new technologies."

For road bridges, the design technology standard was revised in 2017 from the allowable stress design system to the partial factor design system, and the conditions that "enable a design to adequately and meticulously realize safety, reliability and other performance requirements" were specified. The department studies ways to achieve structural goals under these conditions with new technologies such as high strength material. For technical standards of other road structures, we also organize the performance requirements systematically to ease the utilization of new technologies.

Additional, the department conducts the following in cooperation with the Road Bureau.

- Clarifying the requirements of new technologies that correspond to field needs by exchanging opinions with concerned persons in the field, industrial associations, and technical developers.
- Establishing performance evaluation criteria that can serve as an index for determining the applicability of new technologies, and performance evaluation methods.
- Addressing the utilization and revision of the "New Technology Assessment Guidelines," which organize the viewpoints and considerations for proper assessment of conformity with technical standards (performance assurance).
- Participating in the planning of various systems concerning new technologies, such as public solicitation for technologies / field demonstrations by the New Technology Information System (NETIS) (theme setting type) and Road Bureau, and technical research and development contributing to quality improvement in road policy, and technical support so that new technologies match needs and are correctly implemented.

Through the activities described above, the Road Structures Department intends to contribute to roads that lead to people's happiness.

[References]

- 1) Material of the 73rd meeting of the Basic Policy Group, Road Subcommittee, Panel on Infrastructure Development
http://www.mlit.go.jp/policy/shingikai/s203_seisaku01.html