
Efforts of the Road Traffic Department for Road and Traffic Innovations

FUKUSHIMA Shinji, Director, Road Traffic Department

key words: ETC2.0, autonomous driving, special vehicle travel permit, people-centric road space, no utility poles

1. Introduction

Roads in Japan have greatly contributed to an improvement in the wealth and quality of life as land infrastructure in Japan. But, roads must continue to respond to rapidly progressing technological innovation, reconsiderations of the relationship between people and cars, and social needs through the pursuit of new forms of cooperation / collaboration in the road space. Given the situation, the Road Subcommittee of the Panel on Infrastructure Development prepared a proposal as a future vision of road policy, titled "Road and Transportation Innovation", in August 2017.

In addition, the Road Act was amended in March 2020 for the purpose of ensuring road traffic safety and promoting smooth and effective use of roads.

Specifically, the revised act newly stipulates the "foundation of a new traffic system of special vehicles for improving the productivity of logistics", the "promotion of development of new transport nodes in cooperation with the private sector", the "establishment of pedestrian-centric road spaces for the wealth of community", and the "development of infrastructure that assists autonomous driving in the road space".

This paper introduces part of the activities of the Road Traffic Department, NILIM, in reference to the road traffic systems we should aim for in the future, the amended Road Act, etc.

2. Strengthening traffic management with full utilization of ICT, etc.

(1) Road traffic management using big data

ETC 2.0 can collect travel and behavior histories of vehicles logged by supported on-vehicle units through the roadside units installed by the road administrator. These on-vehicle units are widely mounted, totaling about 4.62 million as of the end of January 2020, and it is possible to utilize these probe data as big data. Probe data on the speed, location, etc. of vehicles equipped with ETC 2.0 can be obtained in time and space sequences regardless of types of road.

NILIM is conducting R&D activities into traffic management by grasping the situation of road traffic in real-time using ETC 2.0, road monitoring cameras, etc. For example, traffic safety measures including speed control and through-traffic access control measures are implemented on community roads by utilizing analysis results of ETC 2.0 data to identify

dangerous spots, such as where abrupt slowdowns occur, etc. Furthermore, by utilizing ETC 2.0 data to additionally analyze the effect of measures, NILIM is conducting R&D into upgrading analytical methods and technical support for road administrators.

(2) Making ETC 2.0 probe data open

In order to promote open innovation via big data utilization, it is necessary to establish a mechanism for making proper data accessible, including secondary use, within the viewpoint of personal information protection. With the aim of making ETC2.0 data collected by government open and promoting its utilization, NILIM has been conducting joint research in cooperation with industry since October 2018.

3. For realization of autonomous driving

(1) Autonomous driving road tests at

Michi-no-Eki (Roadside rest area, etc.)

Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has been conducting road tests of autonomous driving services at Michi-no-Eki and other central locations, with the aim of social implementation by 2020. The purpose is to ensure the flow of people and logistics, which are critical to community revitalization, by utilizing self-driving vehicles in hilly and mountainous areas affected by a super-aging population and other issues.

For the road tests, short tests of about a week and long tests of 1 to 2 months were conducted to study technical issues and business models. Regional Development Bureaus teamed up with various players to organized local oversight councils involving experts, local governments, vehicle suppliers, etc. and NILIM provided technical support.

Based on the results of these road tests, full-scale introduction just started for the first time in Japan in November 2019 at "Kamikoani," which is the Michi-no-Eki (roadside rest area) in Kamikoani-mura, Kita-Akita-gun, Akita.

(2) Development of infrastructure that assists autonomous driving in the road space

For autonomous driving to ever happen, not only vehicles but road infrastructure need to support it, including recognition of magnetic markers and other driving support infrastructure installed along roadways, which is why the Road the Act was amended. NILIM is exploring, in cooperation with concerned

organizations, what kind of infrastructure might assist autonomous driving, such as electromagnetic induction lines and magnetic markers that were developed for the road tests at Michi-no-Eki, and how to ensure travel space for self-driving vehicles.

(3) Provision of merge support and pre-read information

Self-driving vehicle technologies that support safe driving, such as an automatic braking system, have been developed in cooperation / collaboration with and between car manufacturers, IT companies, etc. and already installed on commercial vehicles. In order to realize fully autonomous driving, information on roads is also needed, such as the traffic situation on trunk roads at expressway junctions and traffic restrictions on the road ahead, when information solely from the self-driving vehicle technologies is insufficient.

NILIM started joint technical studies with industry (first phase started in Sep. 2012; third phase started in Jan. 2018) into merger support service for expressways, providing information on lane restrictions / obstacles on the road ahead, service for providing information on toll gate open / close status, etc.

4. System for new traffic system of special vehicle

In accordance with the increase in demand for distribution by large vehicles, the burden of business operators, such as the longer time needed to complete travel permit procedures for special vehicles, (which exceed a certain limit in vehicle weight, length, etc.) has grown and, consequently, productivity has declined.

In the last revision of the Road Act, a system was established that allows registered special vehicles to drive the road immediately and their traveling routes etc. and checks the route actually traveled, etc. through ETC2.0. NILIM is conducting system design, etc. for establishment of a new system that checks traveling route, etc.

5. Promotion of utilization of road space

(1) Reorganization of road space and establishment of people-centric road space

While the volume of vehicle traffic is decreasing on some roads because bypasses have been built, the volume of pedestrian traffic is increasing on other roads and making it necessary to construct people-centric road spaces. Accordingly, the amended Road Act established a system for designating roads for construction as popular road spaces ("Pedestrian-Friendly Roads").

NILIM has organized design methods for enhancing the effect of road space redevelopment projects and guidance on how to build consensus and promote utilization of road spaces, and has been conducting

technical studies on constructing people-friendly road spaces based on the amended Road Act, etc.

(2) Promotion of no utility poles

MLIT has been systematically working to remove utility poles from the viewpoint of improving the disaster prevention capacity of roads, ensuring safe and comfortable travel spaces, developing good landscapes, and promoting tourism. However, progress is far behind major European and American cities partly because of the high costs. MLIT also intends to remove utility poles because many poles were damaged and toppled by strong winds during typhoons last year. NILIM is studying technical issues in order to introduce a low cost method of removing the utility poles and smooth build consensus amongst the relevant organizations, etc.

6. Conclusion

This paper introduced some of the activities for road and traffic innovation that are needed because of the fast pace at which the relationship of people, cars, society, and technology surrounding roads is changing, on account of Japan's super-aging society, changes in fuel and vehicle ownership as represented by ride-sharing, micro mobility, and autonomous driving technologies. In addition, the Basic Policy Group of the Road Subcommittee of the Panel on Infrastructure Development has reviewed this new relationship between people, society, and roads and launched studies into the kind of society road policy should target and possible mid- to long-term policies for realizing such a society. In response to the various changes stated above, NILIM is committed to realizing safe and smooth road traffic in a quick and flexible manner over the mid to long term.