For the Realization of the Roles That Roads Should Play

TAKAMIYA Susumu, (Ph.D.), Director, Road Traffic Department

key words: road traffic management, traffic safety, road space reconstruction, automated driving

1. Introduction

Roads constructed across the land of Japan have greatly contributed to the improvement in affluence and quality of life as important infrastructure that connects the nation. Roads need to continue to fulfill this role while accurately incorporating factors such as technological innovation even in the recent social environment that has been characterized by a decline in population, the arrival of a super-aged society, and the need to revitalize regional economies. On the other hand, from the perspective of the direction of medium-to long-term road policy, the roles that roads should play have been reconsidered, e.g., roads should not only be spaces for the movement of people and goods, but roads themselves should become places where people stay. In this regard, points are summarized in the suggestion of the Road Subcommittee of the Panel on Infrastructure Development [1] and the proposal of the Basic Policy Group of the same Subcommittee [2]. This paper, focused on the field of road traffic in particular, introduces some typical approaches made by the Road Traffic Department in relation to the roles that roads should play.

2. Effective use of road networks

In addition to the existing approaches to developing road networks, we should also focus on the stable use of road networks and maximizing the demonstration of road functions. From this perspective, it is necessary to realize "road traffic management" that maximizes the functions of roads and uses roads wisely through a proper understanding of road traffic conditions and guiding effective improvement measures by fully utilizing ICT (big data, AI, etc.), which is rapidly advancing in technological innovation.

The Road Traffic Department conducts research to grasp road traffic conditions in real-time by mainly obtaining traffic volume data from traffic counters, as well as from the images of road management cameras using AI technology, and obtaining travel speeds, distribution of generated / congested traffic, information on vehicle routes, etc. from ETC2.0 probe information and analysis using the same information, etc. We also continue research into road traffic management by predicting the road traffic situations in the near future based on the information above and studying how to actively control the road traffic situations.

3. Realization of traffic safety

It is desirable to create a road space where everyone can move around safely and comfortably by further promoting traffic safety measures on arterial roads, community roads, school routes, etc. From this perspective, it is necessary to effectively identify accident risk points and to accurately plan and implement traffic safety measures by using big data in addition to traffic accident data. In addition, for community roads used as a part of daily life, it is desired to spread the awareness that "people have priority on roads for daily life" deeply into the public and to create a traffic environment where cars naturally show consideration for pedestrians and other traffic.

The Road Traffic Department, using big data including traffic accident data and ETC2.0 probe information, has been working to effectively identify risk areas where accidents or sudden deceleration occurs and, particularly for community roads, accurately identify the routes where traffic travels through the community. Furthermore, regarding community roads, the Department has been studying effective measures to control vehicle travel speeds and through-traffic in communities.

4. Road space that meets various needs

It is desired to study the reconstruction of road space in the entire road network and to make previously used roads (existing roads) into a safe, comfortable and lively road space through bypass development and revitalization of existing roads as a human-centered road space, etc. In addition, it is desired to develop "curbside management" for roads located in the center of towns, where space can be used in various ways, according to the day of the week and time of the day, such as a space for getting in and out of cars or an open cafe, in addition to the integrated use of roads and privately owned land along roads and the easing of roadside use by restaurants, etc. along roads under the social environment affected by the COVID-19 pandemic. With regard to the creation of a lively road space, the Road Act, etc. were revised in May 2020 to establish a "Road system that promotes pedestrian convenience" and allow the development of a space where pedestrians can pass the time in addition to conventional space reserved for sidewalks, etc. (**Fig. 1**).

The Road Traffic Department is compiling useful knowledge through the collection and analysis of examples of reconstruction of existing roads in line with bypass development and the integrated use of roads and privately owned land along roads. We also are studying how to create lively road spaces by collecting examples and knowledge, examining approaches to road space formation, etc.
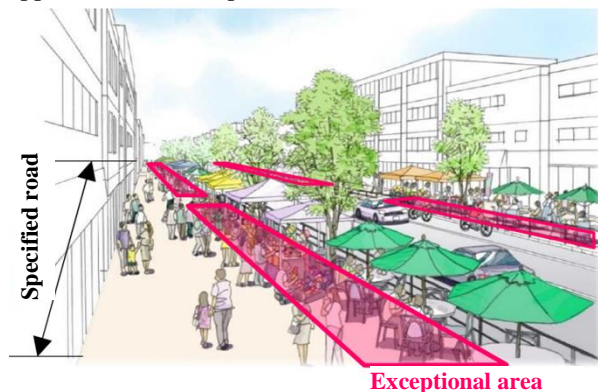

Fig. 1: Image of a road that promotes pedestrian convenience

5.   Realization of automated driving

By automating and reducing the labor of moving people and goods through automated driving, it is desired to realize a safe and efficient road service and contribute to the formation of communities where people's lives and livelihoods can be sustained, business productivity can be improved, and thereby realize sustainable economic and social activities. As examples of automated driving applications, in addition to realizing automated driving services on expressways and other roads that connect the nation, it is also desired to realize automated driving services based out of "roadside stations in mountainous regions" where administrative offices and other services necessary for daily life are concentrated.

As for automated driving technologies, autonomous vehicle technologies for safe driving, such as automatic braking based on information detected by onboard sensors, have been developed and are being installed in vehicles. However, in order to achieve more effective automated driving, information that supports precision control of the vehicle in situations where information from only autonomous vehicle technology is insufficient can be provided to vehicles from the road (**Fig. 2** shows an example). In May 2020, as a result of revision to the Road Act, etc., automated driving support facilities such as magnetic markers have been positioned as road accessories in order to assist position correction, etc. from the road side for the safe operation of automated vehicles.

The Road Traffic Department is studying the technical specifications, etc. for "merging traffic support information services", etc. to be realized on expressways, using a framework of public-private joint research. In order to realize automated driving

services around roadside stations, etc. in mountainous areas, we are studying how to set up automated driving support facilities, etc.
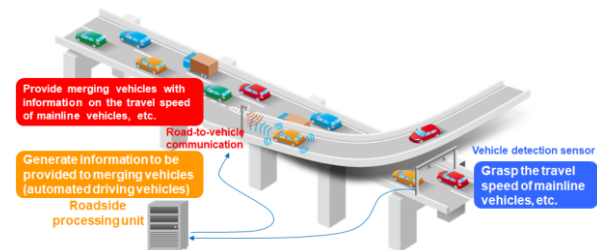

Fig. 2 Merging traffic support information system

6.   Conclusion

This paper has introduced some of the efforts of the Road Traffic Department to realize the roles that roads should play. The Road Traffic Department will continue to conduct research that is needed, as well as to accurately recognize the roles that roads should play.

[References]
1) Suggestion of the Road Subcommittee of the Panel on Infrastructure Development: "Road and Traffic Innovation: --- Toward the Realization of Affluent Lifestyles through the Pursuit of Functional Improvement and Utilization of Roads---", 2017.8 https://www.mlit.go.jp/common/001201778.pdf
2) Proposal of the Basic Policy Group, the Road Subcommittee of the Panel on Infrastructure Development: "How Road Scenery Will Change in 2040 --- Roads Designed to Make People Happy ---", 2020.6 https://www.mlit.go.jp/road/vision/pdf/01.pdf