

# Messages from Departments and Centers of NILIM

## Towards effective use and appropriate maintenance of the road stock —Initiatives under a new organization—

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### 1. New Organization

During the past period of more than half a century since the beginning of full-scale road construction, roads have played a role as the infrastructure supporting social and economic activities centered on automobiles while forming a quantitative stock. But, the environment surrounding roads has been greatly changed and will continue to change. This change means that the stock which has been formed should be used more effectively and the stock should be appropriately maintained.

For road users, problems remain; namely road traffic accidents and congestion. Taking traffic accidents as an example, 4,373 fatalities occurred in 2013, which is 1/4 of the record-setting 16,765 fatalities which occurred in 1970, but fatalities of pedestrians and cyclists has risen from about 38% of all road traffic accident fatalities in 1993, which it was at its lowest level, to about 50% in 2013. Annual congestion loss time is about 5 billion hours, or about 40 hours per person. There are many problems related to the use of the stock which has been formed, requiring that the stock be used more effectively, by improving road space or effectively use networks and so on.

Regarding the appropriate maintenance of the stock which has been formed, problems with technology methods, standards, systems, technological capability etc. for the maintenance of aged and deteriorated structures have been pointed out, requiring that technology methods be established and support systems be constructed quickly. The Great East Japan Earthquake showed the importance of opening roads and of overlapping and alternate networks. To improve wide area disaster prevention, it is necessary to manage roads so that they can function as networks immediately after a natural disaster.

Road related departments and centers of the NILIM have worked in cooperation with concerned bodies such as the headquarters of the Ministry of Land, Infrastructure, Transport and Tourism in order to technologically support such effective use and appropriate maintenance. But to be able to respond more flexibly and appropriately, as shown in the figure, beginning in FY2014, the Road Traffic

Road Traffic Department
Research Coordinator for Road Affairs
Research Coordinator for Road Traffic Information Technology
Research Coordinator for Road Disaster Prevention
Traffic Engineering Division
Road Environment Division
Intelligent Transport Systems Division

  

Road Structures Department
Research Coordinator for Road Structures
Bridge and Structures Division
Foundation, Tunnel and Substructures Division
Pavement and Earthworks Division

Figure. New Organization of Road Related Departments in FY2014

Department and the Road Structures Department which include necessary research coordinators and divisions have been set up to conduct surveys and research.

### 2. For effective use of the stock—Road Traffic Department

To reduce traffic accidents involving pedestrians or cyclists and relieve congestion, road space planning and improvement methods centered on pedestrians and cyclists and bottleneck countermeasures are being taken. The accident rate on expressways is about 1/10 of that on ordinary roads, and CO<sub>2</sub> emissions of a small-size car on an expressway are about 2/3 of that on ordinary roads when the traveling speed on each type of road is assumed to be 80km/h and 20km/h respectively. Improving safety measures and reducing congestion on the existing ordinary roads, and conversion of trips from ordinary roads to expressways according to their purposes, origin/destination and so on both help reduce traffic accidents, congestion on ordinary roads, and CO<sub>2</sub> emissions, and the Panel on Infrastructure

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Development , Road Committee, Basic Policy Sub-committee and National Arterial Road Sub-committee have, as one theme, discussed the intelligent use of networks.

ITS Spots have also been placed along ordinary roads, so road managers can now obtain more information about road traffic. Furthermore, there is information about the movement of automobiles and people that private companies collect, process, and provide. Various ways of using these types of information are considered, and effective applications are expected to be constructed in order to effectively use the existing stock including networks.

In order to effectively use such existing stock, the Road Traffic Department will mainly undertake the following research.

- (1) Improvement of safety for pedestrians and cyclists
  - Methods of promoting safety countermeasures for roads in residential districts
  - Methods of designing bicycle paths
- (2) Effective use of information and of information communication technologies

Information and information communication technology studies are undertaken assuming that these can be applied to improve many aspects of road traffic, and we wish to continue these initiatives in the future. Specifically, the following are given as examples, Studies will include system design considering necessity.

- Methods of clarifying the state of movement, such as OD, of automobiles, bicycles, and pedestrians
  - Methods of clarifying and evaluating the levels of road services
  - Methods of clarifying hazardous spots
  - Methods of clarifying congestion locations, causes, and range of impacts
  - Methods of smooth traffic and safe driving assistance on expressways
  - Methods of clarifying state of use of road networks including their use after disasters
- (3) Road structures adapted flexibly to regional conditions

### **3. For appropriate maintenance of the stock—Road Structures Department**

In deteriorated road structures, problems have appeared including breakage of steel, fallen concrete slabs, breakage of suspension bridge cables, crumbling of concrete lining of tunnels, and so on.

In response to the 2013 revision of the Road Act, technology standards for maintenance were enacted in March 2014, and inspections, diagnosis, recording and other maintenance will be conducted according to these standards including that done by cities, towns, and villages. But to perform rational maintenance under harsh financial conditions, inspection methods which are economical and rational, accurate methods

of assessing soundness, and asset management methods are needed.

In order to maintain the functions of roads or to rapidly restore them after a disaster, there must be no structures on the road which have sustained fatal damage. For this purpose, it is necessary to develop soundness evaluation methods with concepts common to all types of road structures. This is not simply soundness evaluation for maintenance purposes; it is a problem that should be considered from the design stage.

In order for road structure maintenance to be a method rational and systematic from the structure perspective and network functions perspective, the Road Structure Department will conduct the following researches.

- (1) Appropriate inspections and evaluations
  - Monitoring methods
  - Inspection methods using non-destructive inspection
  - Soundness evaluation methods
- (2) Asset management
  - Public risk evaluation method
  - Comprehensive maintenance indices common to most types of structures
- (3) Coordination design and maintenance concepts among structures
- (4) Safety evaluation methods for non-structural members which work united with structural members , and new technologies and new materials etc.

We will clarify concepts of performance required concepts of setting safety factors and concepts of ensuring safety (only safety factor/introducing fail safe) to study the adoption of new technologies and new materials.

### **4. For Support for road administration—common to both departments**

Both the Road Traffic Department and Road Structures Department will, in addition to the above, work to spread research results at academic conferences, and coordinate with the MLIT headquarters and other concerned organizations so the results are reflected in technology standards and policies.

And of course, we will accept engineers from road administrations including those from cities, towns, and villages, and aggressively provide them with technology consulting services.

[Sources]

Panel on Infrastructure Development , Road Committee, 44th Basic Policy Sub-committee meeting, and 11th National Land and Arterial Road Sub-committee, meeting documents (February 7, 2014)

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