

Messages from Departments and Centers of NILIM

For the maintenance and renewal of the aging road structures

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(key word) Road structure, Aging, Maintenance, Renewal

1. Recent Movements

In January, 2013, the Social Capital Maintenance Strategy Subcommittee and the Social Capital Improvement Council made urgent proposals. They were based on that the painful accident of sudden ceiling collapse that occurred in the Chuo Expressway Sasago tunnel on December 2, 2012, and caught attention raising people's uneasiness that urgent maintenance is necessary for the aging social capital.

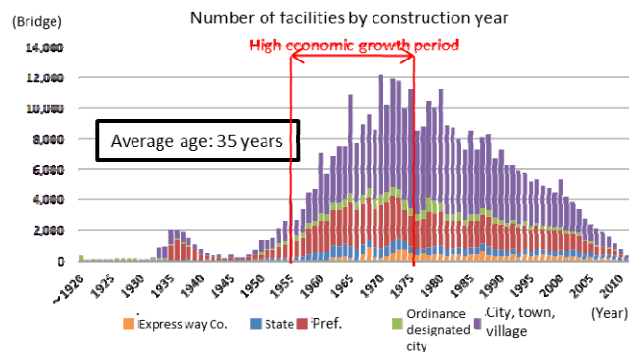
In the table, the plans/proposals regarding social capital which are made mentioned its maintenance and renewal are introduced. And as a new movement, "Road Maintenance Engineering Subcommittee" was set up under the Road Sectional Committee, the Social Capital Improvement Council on January, 2013 to examine the technological standards concerning road maintenance, general inspections of the operations, and ideal ways of standards for appropriate maintenance of the road structures. Maintenance necessity and importance of aging social capitals are pointed out beforehand, and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and related organizations, have worked on maintenance and inspection including research and development for them. However, reflecting various recent movements, not only for institutions under MLIT but also for local government are requested to take measures, and it is starting.

2. Aging road structures and current maintenance status

Road bridges (bridges with length of 2m or more), and a number of tunnels according to the administrators and construction years are shown in the figure. There are about 700,000 road bridges in its entirety, and the average age is 35 years (construction year is unclear on 300,000 bridges), about 20percent (140,000 bridges) are administrated by prefectures, and about 70 percent, 480,000 bridges, by cities, towns and villages. Among these, 1686 bridges are restricted for traffic, and 326 bridges are closed (as of April, 2012).⁵⁾ There are about 10,000 tunnels in its entirety, and the average age is 33 years, and there is no big difference in aging with

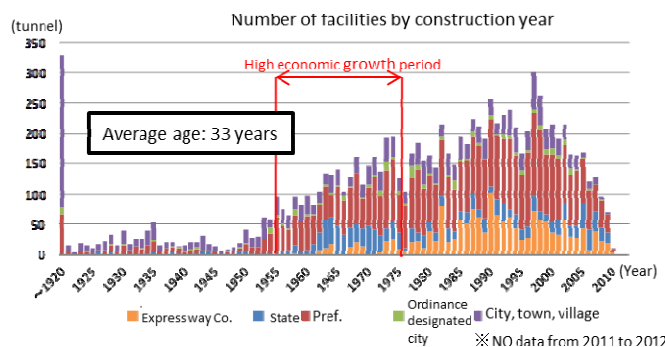
Table Recent main plans and proposals regarding maintenance renewal, etc.

Social capital improvement emphasis plan (August, 2012) ¹⁾ Emphasis target 4 Conduct exact maintenance and renewal of social capital
Social capital maintenance strategy subcommittee emergency proposal (January, 2013) ²⁾ Comprehensive enhancement of infrastructure policy for real maintenance era - kick off "Maintenance policy first year" -
Ministry of Land, Infrastructure, Transport and Tourism technology basic plans (December, 2012) ³⁾ Emphasis project II Social capital maintenance and renewal project
Emergency economic package for Japanese economic recovery (cabinet decision in January, 2013) ⁴⁾ To conduct the social infrastructure overhaul promptly, and take measures for necessary urgent repairs etc. -(omission) To promote the scheming and strategic maintenance/renewal of social capital preparing for the aging in the future



Note) other than this, construction year unknown bridges are 301,000 due to old and no records

(a) Bridge



Note) other than this, construction year unknown tunnels are 250 due to old and no records

(b) Tunnel

Fig. Number of road facilities by admin and construction year⁵⁾

bridges though there is a difference in that prefectures administrate about 50 percent. About 40 percent of the cities, towns and villages conducted the inspection of tunnels and 30 percent or less of them conducted it of the accessories to roads before the Sasago tunnel accident, and about 80 percent of cities, towns and villages did not use the specific procedures for tunnels and accessories.⁶⁾

3. Inspection Procedures

Some administrators did not inspect and some structures were not inspected, and so the Road Department of NILIM examined the general inspection procedures to be conducted in the whole country. Then we targeted bridges, tunnels, pavement, road accessories, side slopes, embankments, retaining walls, with the view point to prevent third party damage caused from structure corrosion and deterioration etc., discussing with Road Bureau of MLIT, related organizations and the specialists.

As for the periodic inspection, some administrators did not define procedures for structures, and are requested to define. We will summarize them cooperating with related organizations.

4. Towards forming strategic cycle of maintenance and repair

Effective and efficient maintenance is requested because the number of aging structures is increasing. For that, periodic inspection and diagnosis, formulate systematic preventive maintenance plan, maintenance cycle establishment, cycle effect to heighten preventive maintenance, and technical methods of each process are necessary to rationalize and upgrade, and we will work on emphatically cooperating with related organizations.

① Diagnostic technique of deterioration and damage, and Performance evaluation techniques of structures

We work on the research for, technology for appropriate evaluation and diagnosis of deterioration and damage of structures, influence of them on structure performance, performance evaluation technique of current load bearing capacity considering the influence of repair and reinforcement.

② Structure management method from the viewpoint of road network function

The health of road structures should be evaluated as a route when seen from road user's standpoint. And, when thinking of the large-scale earthquake etc. health should be considered based on multiple securities. Therefore, we work on the research technique to clarify the level that should be maintained as structure performance, and to evaluate the structure health by one idea from the function requesting each link in road networks of a

certain area.

③ Techniques to make the entire road structure long-lived

The entire country must improve to make the entire social capital long-lived in addition to the view point of individual structures and maintenance of them forming road network. For this, it is important to grasp the deterioration tendency from macro viewpoint and to establish proper countermeasures. Therefore, we will construct the database to collect and accumulate the inspection and diagnostic results of road structures and maintenance information of the repair results etc. on a nationwide scale, cooperating with the administrations. Furthermore we will try to construct maintenance methods like analysis methods of current state of problems, technical corresponding methods to them.

④ Administrator's support

For the maintenance of the structures, not only technological standards and manuals but also engineers who can diagnose the structure are necessary.

We try to share and to spread the technical findings and knowhow owned by NILIM, and contribute to the education of engineers on the maintenance site, by promoting the research and investigation such as correspondence to the technical problems and establishment of technical methods cooperating with the engineers of regional bureaus etc. And, technology consults on the road structures corresponded by the Road Department (including the training lecturers and committee members), were 134 (end of February, 2013), and there are technical problems in many organizations, therefore we will make an continuous effort for direct technical support to the administrators.

5. Conclusion

The Road Department of NILIM is working on the road structures, and on study about the road traffic, safety, environment, and landscape.

In the future also, based on the economic situation of domestic and foreign society, we will work on the study cooperating with administration, university, independent administrative organizations, academic society and association, private sectors, citizens and foreign organizations.

【Reference】

- 1) <http://www.mlit.go.jp/common/000221986.pdf>
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- 6) Road maintenance subcommittee 2nd subcommittee data