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#### *Roads and quality of life*

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## **Road Improvement and Road Policy in Japan**

### Summary:

This paper deals with road improvements implemented in Japan up to now, road-related issues such as traffic congestion, environmental conservation and traffic accidents, the road policies to be embodied in the next 5-year road improvement program starting in 2003, and an evaluation system for Japan's road administration. Firstly, the full-scale improvement of the nation's road network started in 1954 when the first road improvement program was launched, and has continued to date. The implementation of the program has enabled the trunk road network consisting expressways, national roads and prefectural roads to be developed to a certain level to link key cities across the country, and the network has played a key role in carrying passenger and freight traffic generated by socioeconomic activities. On the other hand, the road improvements have produced negative impacts such as traffic congestion, environmental degradation, traffic accidents and poor roadscape. Various measures have been taken to resolve these road-related issues, but they are still serious. Secondly, Japan's road policies are treated by making reference to the next 5-year road improvement program which is currently in the process of formulation. The following four policy goals are set up for the program: i) restoring economic vitality through urban renewal and community cooperation; ii) enhancing life quality of the people; iii) ensuring safe and secure lives; and iv) achieving environmental conservation. Further, the paper refers to proposed drastic reforms in the road administration system to achieve the four policy goals, and discusses various reforms to be introduced such as outcome-oriented project evaluation system, effective utilization of the existing road network, diverse pricing systems for toll roads, enhancement of project transparency and accountability. Finally, the evaluation system for the road administration is discussed in depth. The discussions cover measures and projects related to roads, expertise used for the evaluation, and the way of performing it.

## **1. Road Improvement Prior to 1<sup>st</sup> 5-year Road Improvement Program**

### **1.1 Before Modern Times**

Once the elaborate central government system was established after the Reformation of the Taika Era(645), a nationwide public road network consisting of the Seven Trunk Roads which included the Tokaido, Tosando, and Sanyodo came into existence. The Seven Trunk Roads became the prototype for roads in later periods, and the arterial railways and expressways built in periods after the Meiji Era roughly follow the same routes taken by the Seven Trunk Roads.

Pedestrian traffic and short-haul goods traffic carried on horseback were the leading players in the road traffic in periods prior to the Meiji Restoration in 1868. The primary reason why wheeled traffic did not develop so much in Japan as in China and Europe was probably our country's topographical characteristics : the land is covered with mountainous areas and crisscrossed by rivers. On the other hand, sea routes were used for hauling goods in bulk. Overland (road) and sea routes complemented each other in transporting people and goods. Needless to say, roads are traffic facilities. In mid-8<sup>th</sup> century, Japan's first roadside tree system was initiated with the systematic planting of fruit trees on both sides of the Seven Trunk Roads. "Tchirizuka", or mileposts came to be built on roads in the 16<sup>th</sup> century to serve as road signs. The roads were in harmony with the surrounding landscape and formed part of it. Road cleaning and other regular maintenance were performed by residents along roads. This is attributable to the commonly held conception of the Japanese people that roads were public property and belonged to society. Thus roads were not only transportation facilities, but also formed part of the landscape and people's living spaces.

### **1.2 Modern Times (after Meiji Era)**

After the Meiji Restoration in 1868 when Japan's modernization dawned, the then government focused primarily on rail and sea transportation services in pursuing its transportation system development policy. In consequence, the trunk railway line length in commercial operation reached 10,000km in 1920 and exceeded 20,000km in 1944, nearly completing the present trunk line network. This network is maintained today and contributes to a high railway share (27% in 1999) in the nation's passenger transportation compared with other countries. On the other hand, less efforts were expended on road development and it was not until the national land reconstruction plan was put into practice after the end of World War□in 1945 that full-scale road improvements started.

## **2. Road Improvement after 1<sup>st</sup> 5-year Road Improvement Program**

### **2.1 Road Network Improvement**

#### **2.1.1 Promoting Road Network Improvement**

After the end of World War□in 1945, the Japanese Government adopted the priority production system that permitted concentrating resources on coal, electric power, steel, and other key industries to reconstruct the devastated national land and economy, thereby pushing forward with the nation's industrialization. However, the nation's transportation facilities were extremely poor at that time and presented bottlenecks in the process of industrialization. To tide over this difficulty the government drew up the 1<sup>st</sup> 5-year Road Improvement Program in 1954 and embarked on full-scale road upgrading. In 1958, a new long-term economic plan was mapped out, followed by the formulation in 1961 of a Comprehensive National Land Development Plan including the improvement of roads and highways, railways and transport facilities, communications, energy supply facilities, and other elements of infrastructure. The economic plan and national land development plan were renewed later several times to sustain economic growth and national land development. On the basis of these plans, highway improvements were pursued steadily up to the existing 12<sup>th</sup> 5-year Road Improvement and Management Program(1998-2002).

In consequence, Japan's arterial highway network, which was in an extremely poor condition at the outset, developed in 2001 into a network comprising about 7,800km of expressways, about 54,000km of national highways, and approximately 128,000km of prefectural roads. The engine that drove the steady road improvement was the Earmarked Tax Revenues System introduced in 1953 to allocate the gasoline tax revenues to road improvements, and the Toll Road System was created in 1952 wherein toll road improvements are financed with borrowings specified in the Road Improvement Special Measures Law enacted in 1952 and toll revenues are used to repay the money borrowed.

As a result, the nation's highway network has expanded as already noted and the number of registered motor vehicles jumped to 71.46 million in 1999 from a mere 920,000 in 1955. During the same period automobile passenger traffic also soared to 955.5 billion passenger-kilometers in 1999 from 27.5 billion passenger-kilometers in 1955 and vehicle cargo traffic to 307.1 billion ton-kilometers in 1999 from 9.5 billion ton-kilometers in 1955.

In the latter half of the 20<sup>th</sup> century, Japan achieved postwar reconstruction with its industrialization and economic growth. In 1999, the nation grew into the world's second largest economic power with its gross domestic product attaining about ¥514 trillion. The arterial highway network built during the latter half of the 20<sup>th</sup> century supported huge traffic flows of goods and passengers generated by rapidly expanding economic activities of the nation. The network also expanded the living sphere of the people and brought them within easy access to vocational, educational, medical, shopping, amusement, and other urban facilities and services.

### **2.1.2 Current Status and Problems**

In the economic development process described above, urbanization, or the trends of population and industry to concentrate in cities, presented itself in major metropolitan areas of Tokyo and Osaka, and other key cities. This created heavy road and railway traffic congestion, housing shortages, and soaring land prices --- serious social problems. In road improvements, as a result of higher priority given to developing the nationwide arterial highway network, the radial highway networks linking the key cities across the country came into existence, but the development of ring road networks within major urban areas lagged behind. As completed arterial highways lacked proper access control, they began to be lined with buildings and presented the appearance of streets and came to lose their functions as arterial highways.

## **2.2 Negative Impacts of Road Improvement**

### **2.2.1 Traffic Congestion Problem and Remedial Measures**

The road networks in Japan have been improved as noted in Subsection 2.1.1, but in urban areas across the country the improvements have failed to keep pace with traffic demand with the result that heavy traffic congestion has now become a chronic phenomenon in cities and has impacted on the social and industrial activities. For example, the average traveling speed of automobiles during morning and evening rush hours has fallen to low levels of 21km/h in metropolitan areas and 24km/h in local cities. The economic loss of the entire nation due to the heavy traffic congestion is estimated at ¥12 trillion annually.

To cope with this situation, the government has, under the 3<sup>rd</sup> Traffic Congestion Mitigation Action Program (1998-2002) drawn up in 1998, been pushing forward with a set of comprehensive anti-congestion measures including the construction of ring roads and bypasses ; grade separation of intersections and railway crossings ; effective traffic demand management measures including the promotion of park-and-ride and efficient physical distribution ; and multimodal measures including the improvement of transfer between different modes of transportation.

The goal of the 3<sup>rd</sup> Traffic Congestion Mitigation Action Program is to eliminate road traffic congestion in about 1,000 out of the 3,200 spots reported as the most congested in the nation.

## **2.2.2 Environmental Issues and Promotion of Remedial Measures**

In 1998, the rates of compliance with the environmental quality standards (EQS) for nitrogen dioxide (NO<sub>2</sub>) and suspended particulate matter (SPM) were low at 35.7% and 12.4%, respectively, in the neighborhoods of the arterial highways in the metropolitan areas of Tokyo and Osaka, indicating that air pollution remained in a serious condition in these areas. The compliance rate with EQS for noise levels along the arterial highways was also low at 37.4% in 1999. Lawsuits were filed by local residents along the arterial highways (National Highway 43 Noise Pollution Suit (1976), Nishi-Yodogawa Air Pollution Suit (1978), Kawasaki Air Pollution Suit (1982), etc.). In these lawsuit cases, the court rulings were in favor of the plaintiff on grounds that the highways involved had obstructed the lives of local residents or produced harmful effects on their health.

On the other hand, the government, in its efforts to pursue anti-pollution measures, enacted the Basic Law for Environmental Pollution Control in 1967 and the Air Pollution Control Law and the Noise Control Law in 1968. Environmental impact assessment, which had been conducted pursuant to a Cabinet decision of 1984, has come to be performed in compliance with the Environmental Impact Assessment Law which was promulgated in 1997. Based on the various institutions stipulated by these laws, the government has pursued integrated measures against air and noise pollution induced by vehicular traffic, such as structural improvement of automobile, improvement of ring road and bypass networks, introduction of low-noise pavements, installation of noise barriers, and subsidization for noise-proof works carried out by local residents along highways. In recent years, global warming induced by emissions of CO<sub>2</sub> and other greenhouse gases has become an issue of grave concern in Japan as elsewhere in the world. Japan is the world's fourth largest CO<sub>2</sub> emitting country accounting for about 5% of the total CO<sub>2</sub> emissions in the world. The transportation sector accounts for about 20% of Japan's CO<sub>2</sub> emissions and about 90% of the emission volume of the sector is produced by road traffic.

The United Nations Framework Convention on Climate Change was signed by many countries at the "Earth Summit" held in Rio de Janeiro in 1992. The Third Conference of the Parties to UNFCCC (COP3) held in Kyoto in 1997 adopted the Kyoto Protocol providing for numerical reduction targets for greenhouse gas emissions. In Japan, the Law for Promotion of Countermeasures against Global Warming was enacted in 1998 to pursue measures against global warming in an integrated manner. Various measures for coping with global warming are being pursued along the line of the Basic Policy for Global Warming Control Measures under the said law. A variety of measures have been implemented in the road transportation sector to reduce the effects of global warming. The measures include the introduction of fuel-efficient cars, highway network improvements for eliminating traffic congestion, and traffic demand management (TDM) for reducing automobile traffic. Despite these measures, however, Japan's CO<sub>2</sub> emissions in 1999 amounted to 1,225 million tons, or 9% increase over 1990 and the CO<sub>2</sub> emissions in the transportation sector increased 23% in 1999 due primarily to traffic growth.

For the conservation of natural environment, since around 1990 ecoroad projects have been implemented extensively in Japan through the application of various mitigation techniques. In recent years, road projects have been executed with due regard for diversity of species including both rare and general species and ecological diversity in order to secure biodiversity.

## **2.2.3 Traffic Safety**

### **(1) Promotion of Traffic Safety Measures**

Traffic death toll, which increased with the progress of motorization in Japan, peaked in 1970 at 16,765 lives, and then decreased year after year until 1999 when it fell significantly to 8,466 lives, a 50% fall from the peak year of 1970. Much of the credit for this decrease is attributable to enhanced safety level as a result of the implementation of drastic traffic safety measures including the development of expressways, bypasses, and ring roads, and the separation of sidewalks and vehicle lanes. Another factor contributing to the decline in traffic fatalities is the fact that the improvement of sidewalks, road lighting, traffic signals, and other traffic safety facilities for roads requiring urgent safety measures because of high accident rates has been actively pursued under the Emergency Measures Law for Provision of Traffic Safety Facilities which was enacted in 1966.

## (2) Current Status and Problems

The traffic death toll began to increase again after falling in 1979 to one half of the 1970 peak. In and after 1989 the traffic fatalities continued to rise above the 10,000 mark until 1992 when the toll attained the annual peak of 11,451 lives and after that it fell to 8,747 lives in 2001, a figure below the 9,000 mark reached for the first time in 20 years.

On the other hand, the number of traffic accidents was on the rise since 1991 and reached 947,169 in 2001—still an alarming situation. The traffic accidents in recent years are characterized by the concentration of arterial highway accidents at specific points and by the high incidence of accidental deaths of elderly persons near their homes. The “Community Zone” project has been implemented intensively. The project consists of developing community roads where both pedestrians and motor vehicles can coexist by integrating intensive measures for accident-prone locations and traffic regulation in residential areas.

### 2.2.4 Current Status and Problems of Road Spaces

At one time road spaces served as places for movements of goods and people and as living spaces where children play and adults converse. However, road development projects oriented toward motor vehicles were implemented without securing adequate road sites to cope with motorization which was progressing at a rapid pace. As a result, sidewalks, planting strips, and other spaces available for the use of pedestrians and roadside residents have become smaller. Due to the lack of spaces for bicycle traffic in smaller road spaces bicycle/pedestrian tracks have been provided on both sides of roads as an emergency stopgap measure to eliminate the space problem for bicycles. However, this problem has remained yet to be solved. Electric poles supporting wires are installed in smaller sidewalk spaces, and coupled with irregular signboards put up at the roadside, they impair the townscape seriously. Thus sidewalks, bicycle paths, planting strips, and the roadscape including roadside areas remain in a poor condition and there is the need for human-oriented road spaces.

## 2.3 Public Perception of Road Improvement

Japan has rapidly pursued its road network development plans for the last five decades of the 20<sup>th</sup> century, and the network has reached a certain developed level. On the other hand, the bubble economy in the latter half of the 1980's burst at the beginning of the 1990's, and the Japanese government resorted to the Keynesian fiscal policy of government spending expansion throughout the 1990's to recover the depression-hit economy. The government pumped funds into road and other public works. However, the economic recovery has been slow, while the long-term debts of both the central and local governments continued to increase. As of 2002 the long-term debts amounted to ¥675 trillion, or about 1.3 times larger than Japan's GDP. Reflecting reactions to such a terrible fiscal situation of the country, the argument has gained ground that government investments in public works should be restrained in the interest of fiscal reconstruction because the nation has already adequate social capital.

In-depth analysis of citizens' views expressed concerning road improvements shows that there exists a wide gap between their expectations and the effects of actual road improvements. They consider it questionable whether adequate road investments are made where they should be. For example, the improvement of ring roads in major metropolitan areas which are contributing to the improved productivity of Japanese industries and to the restoration of our international competitiveness has made little progress due to the delayed process of reaching a social consensus on the road improvements; in mountainous regions there are still left behind those communities which have no easy access to adequate medical, welfare, educational and other services which are essential to the daily life of residents; in urban areas the improvement of planned roads still remains at a level of about 50%; and in residential areas of cities there are growing calls for improvements to roads as living spaces integrated with the roadside areas and where priority is given to pedestrians and cyclists.

In the past, primary importance has been attached to “construction” of roads paying less attention to the viewpoint of users. In consequence, the road functions have failed to come into full play because of such problems as illegal street parking, unregulated road works, and improper signal control of road traffic. In future, therefore, it is necessary to examine how roads are actually used and to take appropriate measures for promoting their effective utilization.

Further, there have been expressed doubts about the efficiency of public works in the light of high project costs, substantial extension of the originally agreed construction period, and the failure of project plans to be amended responding to changes in the socioeconomic situation. The administrative authorities have failed to assume full accountability for these questions. They should listen to the public criticism and distrust and do self-examination.

On the other hand, the government has relied too heavily on the toll road system for the improvement of the nation's expressway networks. The system presupposes redeeming with toll revenues the borrowed funds to finance the expressway network improvements. However, the policy of excessive reliance on the toll road system has now come to a deadlock.

Within the government circles there has been much argument as to the fact that the road-related public corporations running toll roads are having difficulty in operating unprofitable routes, and as to whether it is appropriate for the existing public corporations to continue the development of unprofitable expressways in some parts of the country.

### **3 Future Road Improvement in Japan**

#### **3.1 Long-Term Program**

In Japan, road development and improvement has been implemented pursuant to the 5-year Road Improvement Program formulated under the Emergency Measures Law for Road Improvement. This program gives various measures relating to roads and the costs and locations of expressway projects undertaken by the Japan Highway Public Corporation, national highway projects undertaken by the government under its own control, subsidized national highway projects, and subsidized local road projects.

In addition, local governments have their own road improvement projects undertaken at their own responsibility, although these projects are not included in the 5-year Road Improvement Program.

The 5-year Road Improvement Program is drawn up by the Road Bureau, Ministry of Land, Infrastructure and Transport on the basis of the basic policy for road improvement measures proposed by the Social Capital Development Council set up at the Ministry. The program must be decided by the Cabinet.

In the process of formulation of the 12<sup>th</sup> 5-year Road Improvement Program (1998-2002), the views of experts, well-informed people, and a wide range of road users were heard and reflected in the Program according to the Public Involvement System.

Currently, the procedure is being followed for drawing up a long-term road improvement program for the next 5-year period from 2003. The government has decided on the basic policy of long-term plan formulation for public works with due consideration given to the necessity for individual plans and on a result-oriented basis instead of attaching primary importance to project costs and locations as in the past. Consequently, the next 5-year road improvement program will be mapped out in line with the government policy. The next 5-year program is likely to undergo major changes by comparison with the previous programs.

The following socioeconomic situation and status of road network in Japan are recognized for the formulation of the next 5-year program:

- in regard to the present socioeconomic state of Japan, it should be recognized that having experienced the needy times in their efforts to catch up with the level of Western countries, the Japanese people have now diversified needs in their lives; that while the trends toward lower birthrates and aging population are accelerating, the nation lives in a mature society in this globalization age; and that the people should make endeavors to build sustainable economy and society instead of hoping for rapid growth in future.
- in regard to the present state of road network improvement, it should be recognized that there is the need for proper appraisal of the fiscal and legal systems that have supported the nation's road network improvement; that with a certain level of road stock already built up, there is no more need for uniform and quantitative road development in our country; and that the nation still has plenty of road-related problems to resolve, such as traffic congestion, traffic safety hazards, and environmental issues.

Further, the following switches of paradigm related to road administration are to be incorporated in the next 5-year program:

- Switch from “emphasis on quantitative expansion of road development” to “sharp distinction between new investments and effective use of existing road facilities”.
- Switch from “vehicle-oriented” measures to “measures oriented toward pedestrians and cyclists” in urban areas with due regard for restrictions on the use of automobiles, functions of local streets, and improvement of roadside and global environment.
- Switch from “exclusive road transportation system” to “creation of intermodal/integrated transportation system” with due consideration given to appropriate role sharing with railway and other public transportation.
- Switch from “assistance in nationwide uniform and balanced national land development” to “assistance in individualized regional development”.
- Switch from “pre-assessment system aimed at securing the volume of project” to “outcome-oriented assessment system”.
- Switch to “introduction of flexible rates of toll system” that permits changing toll rates from the standpoint of environmental improvement, efficient physical distribution, and greater mobility.

From these paradigm switches, it was concluded that the major problems which should be resolved in our future road administration are the four points that follow :

- (1) Ring roads intended for eliminating traffic congestion in urban areas, and access roads in the rural areas to the facilities needed for everyday life are still not at an adequate level. It is necessary to relieve the people’s dissatisfaction with inadequate public investments in these roads and such other roads badly needed by the public as the local streets for pedestrians and cyclists.
- (2) Toll roads built with funds raised by borrowing which is redeemed with toll revenues have declined in their advantages and reached their limits now that the improvement level of general roads has gone up. An appropriate means of controlling debt repayment risks should be established, and there are many other points to be improved in the toll road system.
- (3) There is much public criticism that the government has not offered adequate explanations to the people about the too long periods of road project implementation and the falling efficiency level of public works in general. Amid such criticism the road sector should take the initiative in striving to dispel the public criticism and distrust.
- (4) The government should make greater efforts to improve the situation in which completed new roads are not used fully, and should attach greater importance to the maximum use of roads in cooperation with the public and traffic police. In order to reflect these points in the government’s road policy in future, the next 5-year Road Improvement Program has been in the process of formulation, and the program as it is at this stage will be outlined below.

The New Program has four major policy goals and incorporates proposed reforms in the road administration system that constitute the preconditions for achieving the policy goals. Chapter 4 deals with the four major policy goals and Chapter 5 treats the proposed reforms in the road administration system.

#### **4. Four Major Policy Goals of New 5-Year Road Improvement Program**

##### **4.1 Restoration of Economic Vitality through Urban Renewal and Community Cooperation**

###### **(1) Ensuring Increased Mobility**

To maximize the use of the existing road stock and efficiently eliminate traffic congestion in urban areas, it is intended to implement traffic demand management (TDM) measures such as park-and-ride, street parking regulation, and staggered office hours.

It is also intended to carry out a fiscal subsidization program for the construction of multilevel intersections and elevated railway for eliminating traffic congestion due to rail crossings.

In implementing measures for easing traffic congestion such as multilevel intersections, it is intended to introduce a system for collecting congestion data directly from running motor vehicles to grasp the state of traffic congestion accurately.

To provide pedestrians and cyclists with increased convenience in transfers to and from public transportation, it is intended to pursue the improvements to the points of transfer between different modes of transportation, including the construction of a plaza integrated with a railway station building, and the provision of barrier-free facilities and to pursue appropriate measures for diverting automobile users to public transportation.

Further, it is also intended to construct rail tracks of city monorail, new transit systems, and streetcars and to implement measures for assisting public transportation such as the construction of dedicated bus lanes.

To reduce the time necessary for traffic control due to road works, it is intended to encourage the concentrated execution of works in any particular time zone by regulating the hours of works and expanding the controlled excavation area, and to construct underground common utility ducts to accommodate electric wires, gas pipelines and other utility services.

## (2) Urban Renewal

Intracity roads have, as valuable public spaces, diverse functions such as formation of city framework, inducement of roadside land uses, and improvement of urban environment. Therefore, priority will be given to the development of ring roads which form the framework of cities, and to the development of those roads which contribute to the revitalization of urban centers or renewal of the inner cities.

## (3) Formation of Unique Community

For forming unique local communities, it is intended to promote reasonable buildup of urban centers as the community core and their revitalization and to pursue road development in such a manner as to facilitate community building which takes advantage of local characteristics. In central urban areas, efforts will be made for the development of transit malls and the redevelopment of city centers which allow pedestrians and cyclists to move safely and comfortably and which have the greater effects of creating urban prosperity. Efforts will also be made to develop “road stations” ( complex combining rest facilities and commercial facilities including local product shops) built on trunk highways which contribute to revitalizing local communities, and to promote creative road development based on plans formulated by local governments, including high-quality sidewalks so-called walking trail.

## (4) Construction of Road Network Linking Different Areas of National Land

For promoting interchanges between local communities, furthering mobility within living spheres, properly allocating long-distance freight and tourist traffic to expressways, achieving traffic congestion easing, traffic accident reduction, environmental load reduction, and increased efficiency in physical distribution, it is planned to pursue efficiently and effectively development of road networks linking different parts of the national land.

## (5) Support for Increased Efficiency in Physical Distribution

Considering the growing trend toward globalization of world economy, improvement of the nation’s trunk highway networks and access roads to airports and ports, and reinforcement of wider-area physical distribution networks will be pursued in an effort to enhance the nation’s competitiveness in the world market. Efficiency in cargo loading and unloading will be improved to achieve greater efficiency in urban physical distribution.

## (6) IT-Oriented Measures

Efforts will be made for providing sophisticated road transportation services through the application of Electronic Toll Collection (ETC) technology, creating new industries associated with the Intelligent Transport System (ITS), and developing road management database in an effort to pursue the efficient operation of the road administration system. Further, the international standardization activities will be promoted by securing compatibility among the various service systems within ITS and ensuring conformity with the international standards.

## **4.2 Enhancement of Life Quality**

### **(1) Restoration of Safe and Comfortable Roads**

Endeavors will be made to renew local streets in communities as roads integrated with roadside spaces by giving precedence to pedestrians and cyclists and excluding automobile traffic in order to enable the roads to form desirable living spaces in urban areas and to enhance life quality. To form walking spaces which allow people including the aged and physically handicapped to move freely and comfortably, it is also intended to pursue measures for making community roads barrier-free and encouraging the use of bicycles.

### **(2) Building Beautiful Streets**

For improving the landscape and disaster prevention capability of cities and securing safe and comfortable walking spaces, continued efforts will be made to pursue underground laying of electric wires in trunk highways in urban areas on a priority basis and to spread this project to non-trunk roads in middle-scale shopping areas, residential areas, and scenic districts of historical value.

## **4.3 Ensuring Safe and Secure Lives**

### **(1) Securing Safe Living Environment**

Viewing from an international angle, Japanese roads have a higher incidence of traffic accidents and are in a severe situation in point of road traffic safety. The remedial measures for this situation include intensive improvements to intersections and accident-prone spots in trunk highways; creation of secure pedestrian areas in cooperation with traffic police departments in traffic control activities; and pursuit of researches on road traffic safety which serves to deter drivers from causing accidents from the viewpoint of traffic psychology.

### **(2) Precautions against Disasters**

With a view to ensuring the security of national land and people's daily lives, priority measures against earthquakes and other disasters will be pursued in respect of those highway networks supporting the day-to-day activities of local residents and emergency relief activities. IT-based efficient and sophisticated measures for road disaster prevention and relevant technology development will also be promoted to enhance the preparedness of citizens against disasters and their risk management capability.

### **(3) Measures for Impending Replacement Period**

A large proportion of the existing highway structures in Japan were built during its high economic growth period from 1960 to 1990 and are nearing their replacement period. Therefore, appropriate measures will be taken for extending the service lives of the existing highway structures through sophisticated road management systems and longer-life new highway structures, thereby minimizing the life cycle costs of highways. An appropriate asset management system will be introduced to achieve efficient and planned maintenance of highway assets. Development of appropriate technologies needed for this purpose will be pursued.

## **4.4 Preservation and Creation of Environment**

For improving roadside environment and preserving global environment, measures will be pursued in the area of highway administration for smoothing vehicular traffic flows through the improvement of trunk highway networks and for adjusting and controlling demand for automobile traffic, in step with the measures implemented in the area of motor vehicle administration.

To promote the preservation of natural environment, highway improvement will be pursued through the application of techniques for planting highways with trees and minimizing topographical changes due to construction works.

Given below are the specific measures to be implemented for the preservation and creation of environment.

### **(1) Improvement of Roadside Environment**

To reduce PM and NOx emissions from motor vehicles as a result of smooth traffic flows, it is intended to improve trunk highway networks such as ring roads and bypasses, to take measures for eliminating bottlenecks such as multilayer intersections, and to curtail road works.

As steps for managing demand for automobile traffic and thereby smoothing traffic flows, the environmental road pricing system will be introduced whereby tariff levels of toll roads will differ from each other to divert automobile traffic concentrated in residential districts into non-residential areas so as to improve the roadside environment in the residential districts. If considered effective in terms of environmental preservation, a variety of flexible pricing systems will be introduced in toll roads instead of fixed tariff rates. The planned environmental road pricing system is a “social experiment” involving citizens as well as the public sector, and the implementation of the Traffic Demand Management (TDM) policy will be pursued according to the results of the experiment.

To encourage the use of low-emission automobiles, efforts will be expended on establishing fuel supply facilities for low-emission vehicles and their development, and on promoting the wide use of fuel cell electric vehicles.

To reduce automobile-induced noise levels, it is intended to implement a variety of roadside noise reduction measures including construction of high-performance pavements with noise reduction effects, installation of noise barriers, provision of buffer zones, subsidization of anti-noise works for houses under the Roadside Law, and establishing of buffer buildings.

In order to promote the practical application of new technologies for the improvement of roadside environment, field experiments will be conducted to test air cleaning technology for removing NO<sub>x</sub> and PM.

#### (2) Preservation of Global Environment

In order to reduce CO<sub>2</sub> emissions from motor vehicles and thus contribute to the prevention of global warming, it is intended to carry out a set of measures including improvement of trunk highway networks for the purpose of smoothing traffic flows, management of automobile traffic demand, and promotion of the wide use of low-emission vehicles.

For the purpose of controlling the generation of construction wastes and encouraging their reuse in line with the social need for realization of a recycling-oriented society, it is intended to pursue the control of generation of construction byproducts associated with road construction and promotion of their reuse.

#### (3) Preservation and Creation of Natural Environment

With a view to carrying out road improvements with due regard for natural environment and landscape, it is intended to pursue planting roads with quality trees; selection of construction methods and procedures that minimize topographical change and impacts on ecosystem; and creation of biotopes by planting road slopes with trees.

#### (4) Efficient Implementation of Environmental Protection Measures

In order to ensure that environmental protection measures such as management of automobile traffic demand have the full effect as desired, it is intended to adapt the measures to the actual conditions of any particular sites, to carry them out on a planned basis, to monitor the effects of the measures periodically at air pollution monitoring stations, and to review the measures continuously. It is also intended to create a better social climate at each stage of the implementation for enlisting public cooperation in it.

### **5. Reforms in Road Administration System**

The reforms mentioned below will be implemented in the road administration system to attain the four road policy goals stated in Section 4.4 above.

#### **5.1 Selection and Intensive Implementation-Effective and Speedy Provision of Services**

With a view to effective use of limited financial resources available for road improvement and to the effective and efficient implementation of road projects, efforts will be made in future road administration toward proper selection of measures and projects so as to maximize their intended effects. To this end, it is intended to introduce a project execution process based on outcome indexes, to carry out consistent project evaluation, to implement road projects intensively on a priority basis, to ensure thorough performance of project progress control, and to pursue project cost reductions.

(1) Measures Evaluation Based on Outcome Indexes

The administrative measures in the road sector will be evaluated on the basis of the outcome indexes. In each fiscal year, analysis and evaluation of measures performance will be undertaken on the basis of the indexes and the results of such analysis and evaluation will be made public. These results will also be reflected in the compilation of government budgets.

(2) Project Evaluation

Consistent project evaluation will be performed strictly in respect of the entire process from the approval to the completion of projects to ensure their efficient and effective implementation. All the evaluation results will be made public through the Internet or other appropriate means of communication. Continued improvements will be made to evaluation methods including cost-benefit analysis to ensure that the project effects are evaluated more properly. Chapter 6 deals with project evaluation in further detail.

(3) Intensive Execution of Priority Road Projects

With a view to fast provision of a minimum essential road network in a mature society with due consideration given to the progress of the current trends toward lower birthrates and aging population as well as a decline in the working population, it is intended to pursue the intensive execution of priority road projects producing greater benefits in the next 15 years or so.

(4) Introduction of Local Rule

For the purposes of pursuing road improvement and management according to the local characteristics, and thus providing high-quality road services speedily, it is intended to modify the uniform road structure standards and to adopt flexible road structures according to the local characteristics.

(5) Intensive Progress Control of Road Projects

To implement road projects efficiently on a priority basis, it is intended to introduce the time management concept into road projects, to announce the commissioning goals of 5 years later, and to perform intensive project control by checking progress rates each year.

(6) Active Performance of Social Experiments

It is intended to conduct social experiments actively at selected locations for a limited period involving citizens prior to the enforcement of a new policy or project which is likely to produce major social impacts to examine public reaction to such a policy or project as introduction of discounted rates for toll roads for environmental improvement or provision of transit malls in downtown areas..

(7) Development of New Technology and Overall Cost Reduction

Responding to road users' needs, it is intended to map out a new 5-year Road Technology Program starting from 2003 in order to push ahead with the development of new technologies on a priority basis so as to enable their early practical application. It is also intended to keep up information exchanges with industries and universities in other fields than construction and to strengthen tie-up with such industries and universities. Further, it is intended to promote the development of technologies which meet the performance requirements laid down in the technical standards for road construction and overall reduction of life cycle costs of road facilities.

## **5.2 Effective Utilization of Existing Road Stock**

The Government gave higher priority to road construction to overcome the quantitative shortage of roads and failed to give due consideration to the effective use of completed roads so far. In consequence, people have often pointed out "completed roads are actually not in full service" and "functions of existing roads are not fully performed". In order to fully utilize the existing road stock, the following measures will be implemented further:

(1) Diverse Flexible Pricing Systems for Toll Roads

A variety of flexible pricing systems offering discounted toll rates according to diverse users' needs will be introduced after social experiments in order to divert traffic from general roads to toll roads with a view to effective road use, and to the improvement of roadside environment, traffic congestion, and safety problems.(See Section 4.4 (1)).

(2) Promotion of Wide Use of ETC

Comprehensive measures for promoting the widespread use of ETC will be pursued in coordination with road administration and motor vehicle traffic administration divisions to enhance users' convenience by allowing nonstop and cashless passage through the tollgate, to ease congestion at the tollgate, and to achieve environmental improvement.

(3) Elimination of Illegal Street Parking

With a view to elimination of illegal street parking and ensuring safe and smooth road traffic flows, integrated measures will be pursued intensively which include provision of short-time parking for loading and unloading of freight, clear indication of "no parking/stopping" area with colored pavement, and control and enlightening activities by local public safety commissions.

For mandatory parking lots which are regarded as a solution for the illegal street parking problem, the provision of parking facilities operated jointly by the public and private sectors will be pursued on a planned basis.

(4) Strict Control of Road Works

To reduce traffic regulation time due to road works, regulatory measures will be pursued which include strict control of the time and dates of the works, expansion of regulated excavation areas, integrated execution of intensive works, and regulated excavation works, and construction of common utility ducts. In an effort to alleviate traffic congestion due to road works, furthermore, it is intended to establish a road works information system using mass media and website.

(5) Promotion of Real-time Information Transmission

To ensure safe and improved highway traffic through the effective use of the existing highway networks, it is intended to implement measures for facilitating the real-time provision of road information such as congestion and traffic control by means of the Vehicle Information and Communication System (VICS), and efficient road management.

### **5.3 Enhancement of Project Transparency and Accountability**

To win public trust in road administration, it is essential for the Government to make endeavors to ensure the transparency, objectivity and impartiality of the administrative procedures. For the purpose of pursuing road projects more effectively and efficiently, it is effective to incorporate the opinions of citizens and other road users in the road administration. Therefore, the Government will take the following measures.

(1) Partnership between Local Communities and Road Administrator

1) Introduction of PI Road Planning Process at Conception Stage

To ensure the transparency and impartiality of the decision-making process of plan, it is intended to introduce at the conception stage, with due regard for temporally efficient approaches, the PI road planning process in which two-way communication goes on between the road administrator and interested citizens being participated by the third party.

2) Introduction of PI System into Road Management

To conduct road management through the public-private sector partnership in a manner responsive to the needs of local communities, it is intended to pursue PI road performance management in which road management plans requiring the setting of service goals are drawn up and the implementation results of the plans are evaluated.

(2) Enhancement of Accountability

1) Full Accountability and Improvement of Information Disclosure

In order to ensure that the Government discharges its full accountability for the road administration, it will step up its publicity activities for the road administration and publish the results of the policy evaluation based on the outcome indexes at the Road Administration Evaluation Website.(Road IR site).

Further, the Website contents of the Ministry of Land, Infrastructure and Transport, its regional development bureaus, and branch offices will be expanded and updated to improve the quality of information disclosed and user services.

## 2) Communication Activities with Road User

To provide users with better road service by evaluating importance, urgency, and effects of the road policies and measures, it is intended to establish "Road Information Office" which will undertake customer satisfaction (CS) surveys, handle user complaints about roads, and provide counsel in response to requests from citizens. Thus the Road Information Office will carry out extensive communication activities to hear public opinions about roads.

## 5.4 Review of Existing Systems

### (1) Use of Funds Earmarked Exclusively for Road Projects

The funds earmarked exclusively for road projects are based on the principle that beneficiaries must bear the costs; in other words, the motor vehicle users who are the principal users of roads are required to bear the costs of road improvements. If these funds are to be appropriated for purposes which do not benefit motor vehicle users, it would be difficult to obtain their consent because they bear the costs of road improvements.

In the past, the special funds earmarked for road works have been used to finance projects other than road projects such as urban redevelopment and continuous elevated railway construction which have benefited automobile users. In future, based on the "beneficiaries pay principle", the funds will continue to be used on a priority basis for roadside environmental improvement projects and urban renewal projects including continuous elevated railway and transfer facilities between different modes of transportation.

### (2) Reforms in Toll Road System

New organizations and profitability requirements of the four road-related public corporations have been the central subjects of the current deliberation at the meetings of the "Four Road-Related Public Corporation Privatization Committee". Based on the views of this committee, it is intended to undertake an in-depth study on what the future expressway development and toll rates should be.

In regard to the toll road system, it is intended to pursue limited implementation of toll road projects by examining the project profitability more strictly, to pursue drastic cost reductions, and to achieve greater project cost-effectiveness through prioritized investment and greater project transparency through further promotion of information disclosure.

### (3) Role Sharing between National and Local Governments

The national government will be responsible for the administration and improvement of wide-area and trunk highway network which cannot be undertaken by the local governments properly or efficiently. State assistance will be rendered to the local governments from the wide-area standpoint so that the nation's whole road network containing the trunk highway network as the core can function efficiently. Thus it is intended to achieve appropriate role sharing between the national and local governments.

### (4) Introduction of Private Finance Initiative (PFI)

It is intended to pursue studies on road or related projects considered appropriate for implementation under the PFI scheme. The studies will include the scope requirements and procedures of appropriate projects for their implementation under PFI. In the past, PFI was applied to parking lot projects. Efforts will be made toward the selection and execution of road or related projects under the PFI scheme.

## 6. Evaluation of Road Project and Measures

### 6.1 Evaluation System

The evaluation system in road administration can be divided broadly into two groups : (1) project evaluation which deals with each individual road project; and (2) measures evaluation which pertains to measures such as road congestion and traffic safety measures. In 2002 the Administrative Evaluation Law was put into force to make it mandatory for the entire government to evaluate all administrative measures implemented. In the road sector, however, in 1993 the Study Committee for Guidelines Concerning Evaluation of Road Investments was established in the Road Bureau and initiated a study for evaluation of individual road projects.

Project evaluation is classified into three categories according to stages of project implementation. The first evaluation deals with a new road project to examine the effects of the project for its approval. A cost-benefit analysis will be performed to measure the economic effects of the project in quantitative terms. The analysis is intended to select a more effective project by avoiding a project whose cost-benefit ratio is less than 1.5. In consideration of the quality of transportation service, additional evaluation factors have been established for each class of roads to perform evaluation as to whether a road project will contribute to ensuring the competitiveness requirements of any particular region and as to whether the project will contribute to ensuring satisfactory living environment. This evaluation system was introduced on trial to evaluate new road projects to determine whether they should be approved in 1996, and was conducted on a full scale in 1998.

The second evaluation refers to the reevaluation of a project whose actual construction works do not start even 5 years after the project commencement or whose construction works are still not completed 10 years after the commencement. If it is judged as a result of the reevaluation that the project cannot be expected to produce satisfactory effects, it will be examined by the Project Evaluation Monitoring Committee of each executing agency. If the conclusion drawn from the examination is in favor of the discontinuance of the project, it will be abandoned. In 1998, the reevaluation system was introduced on a full scale.

The third evaluation refers to post-evaluation which is performed after the project is completed. If the project fails to yield the effects as expected after the post-evaluation, improvements will be made to obtain the desired effects or some expedient will be devised to derive maximum possible benefits from the project. The post evaluation will determine whether the project involved will bring about the effects as intended, what will be the environmental impacts produced by it, and how a change in the socioeconomic situation surrounding the project will affect it. The post-evaluation system was introduced on a trial basis in 1999 and was conducted for the national road projects carried out by the national government in 2001.

In regard to the measures evaluation, 18 objective indexes including time loss due to traffic congestion, rate of barrier-free facility provision, traffic fatalities, reduction of automobile CO<sub>2</sub> emissions, and users' satisfaction, are used, and quantitative goals of the indexes are set up for public notice to clarify the effects of each individual measure in advance. The actual values of the indexes will be measured each year, and a performance report of road administration will be published. The implementation of the measures evaluation was started with the 11<sup>th</sup> 5-year Road Improvement Program drawn up in 1993. From 2000 the degree of accomplishment of performance goals has been measured for analysis of the project performance. In 2003, the integrated evaluation system consisting of the measures and project evaluations will be introduced in the road sector for the first time with a view to reflecting the evaluation results in the budgeting, planning and executing stages of the road projects.

The evaluation system and results will be announced in the Website of the Road Bureau, Ministry of Land, Infrastructure and Transport : <http://www.mlit.go.jp/road/ir>.

## **6.2 Implementation System for Road Project Evaluation**

For implementing the road project evaluation from economic and social viewpoints discussed in Section 6.1 above, expertise in various fields of engineering such as land surveying, geological explorations, road design, and traffic volume forecast is required, and the evaluation procedures and manuals needed for road projects covering these fields of engineering have been prepared by the Ministry of Land, Infrastructure and Transport, the National Institute for Land and Infrastructure Management and the Public Works Research Institute. These evaluation procedures and manuals are used at national highway offices and local government offices across the country.

Environmental impact assessment (EIA) for road projects demands expertise and technologies covering air, noise, vibration, and water pollution as well as biological, ecological, and landscaping knowledge and technologies. The EIA manuals have also been compiled by the Ministry and the National Institute.

The various evaluation processes in respect of road projects are basically conducted by competent technical staff of the executing agencies. In fact, however, substantial part of the evaluation works is contracted out to consulting firms.

As stated above, economic, social and environmental evaluations of road projects are carried out and once the evaluation results indicate their feasibility, the processes of decision making, planning and execution of projects follow.