



Private Sector Management of Japanese Expressway Infrastructure

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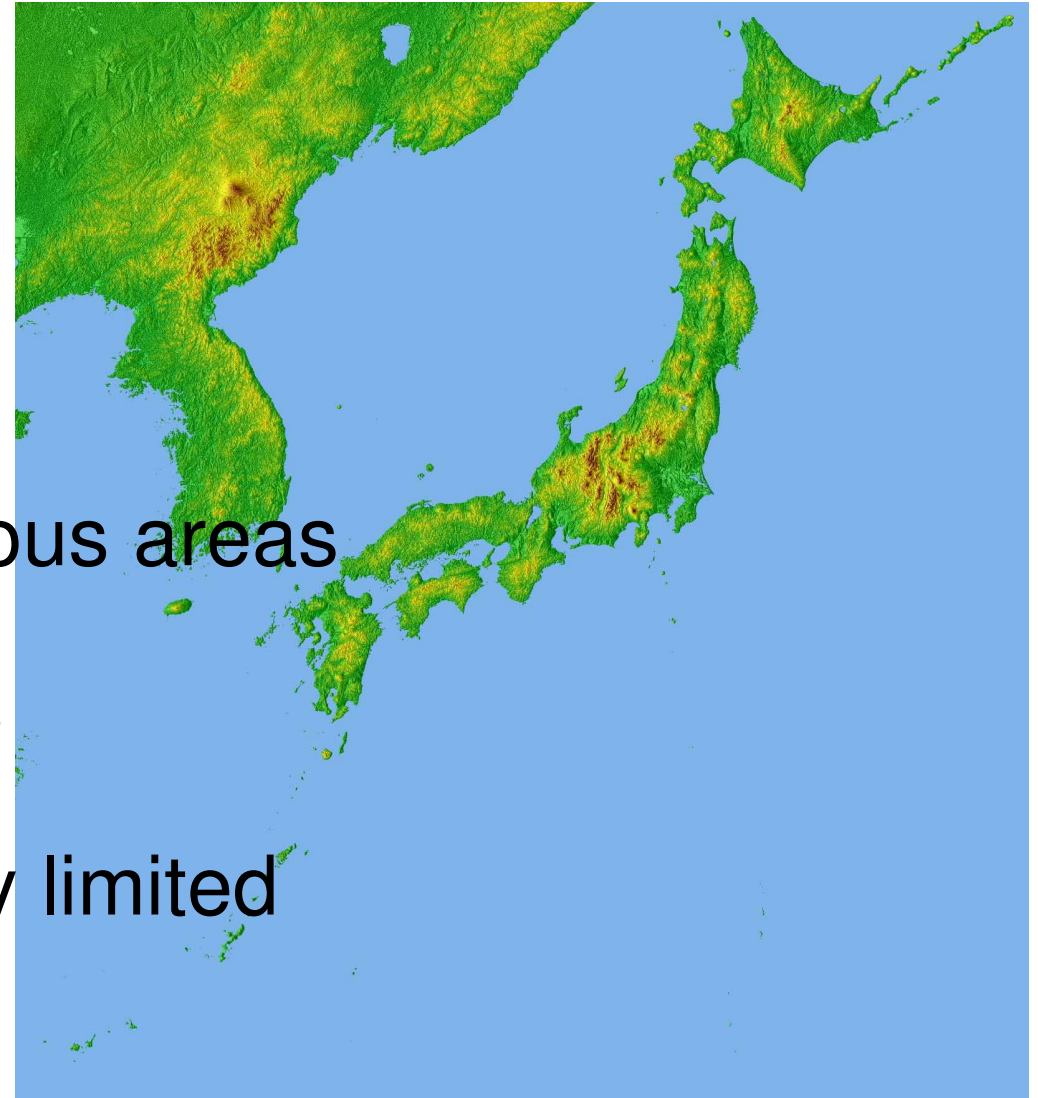
1. Road Infrastructure Development in JAPAN



Osaka in 1960's

Before the modern age (Before 1868)

- Wheeled traffic failed to develop in Japan
 - surrounded by sea
 - covered by mountainous areas
 - crisscrossed by rivers
 - flat dry plains are very limited



The main means of transport were ...

... foot,



Source: Yoshitoshi TSUKIOKA (1867)
"ODAWARA", Encyclopedia of city of Odawara
(<https://www.city.odawara.kanagawa.jp/encycl/>)

horseback,



Source: Hokusai KATSUSHIKA (1831) "Sunsyu-Onoshinden" (<https://fugaku36.net/free/oonosinden>)

and boat.



Source: Hiroshige UTAGAWA (1867) "ARAI", Encyclopedia of city of Odawara (<https://www.city.odawara.kanagawa.jp/encycl/>)

No Paved Roads for 4 wheels.



The modern age after 1868 (Meiji Restoration)

- Japan wished to catch up with the advanced nations of the West as quick as possible.
- Priority in the development of transport systems

↳ *railroad and maritime network*



Source: Tenri University Sankokan Museum
(https://www.sankokan.jp/news_and_information/ex_tg/tg121.html)



Source: Association for the Preservation of the History of Magome and Ota Ward
(http://www.photo-make.jp/hm_2/ma_16_10_1.html)

⇒ Government had hardly developed the road network.

After World War II

after 1945

- Most infrastructure was destroyed by bombing.



Source: "Shinsaibashi after the end of the war", 70th anniversary after WW2
(<https://www.city.osaka.lg.jp/yodogawa/page/0000318495.html/>)



Source: "Photo album of the war damage", War damage in Kobe
(<https://www.city.kobe.lg.jp/a44881/bosai/disaster/war01/war03/index.html/>)

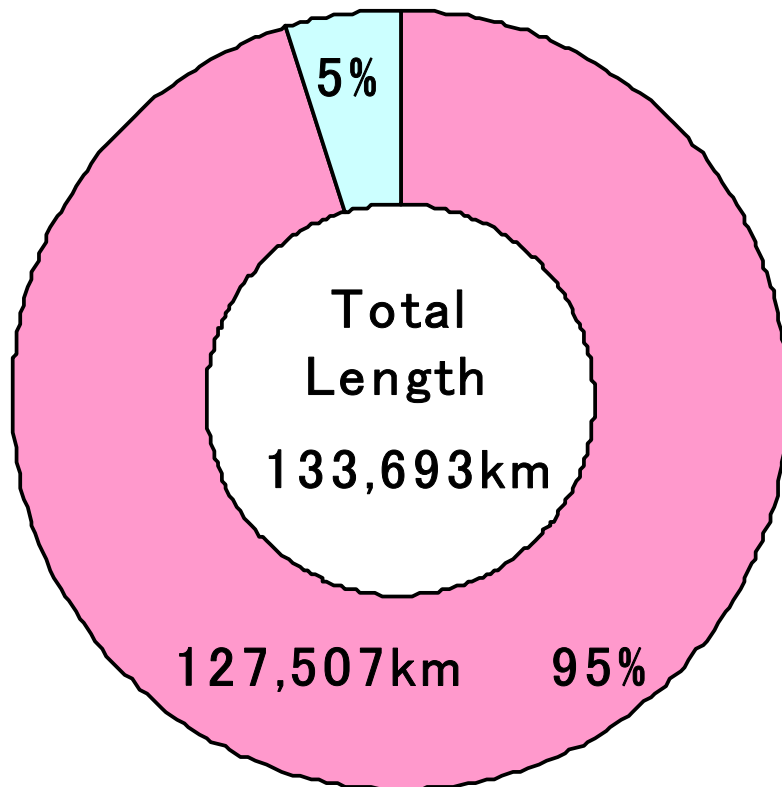
- Transport facilities were poor.
→ bottleneck of industrialization

After World War II

after 1945

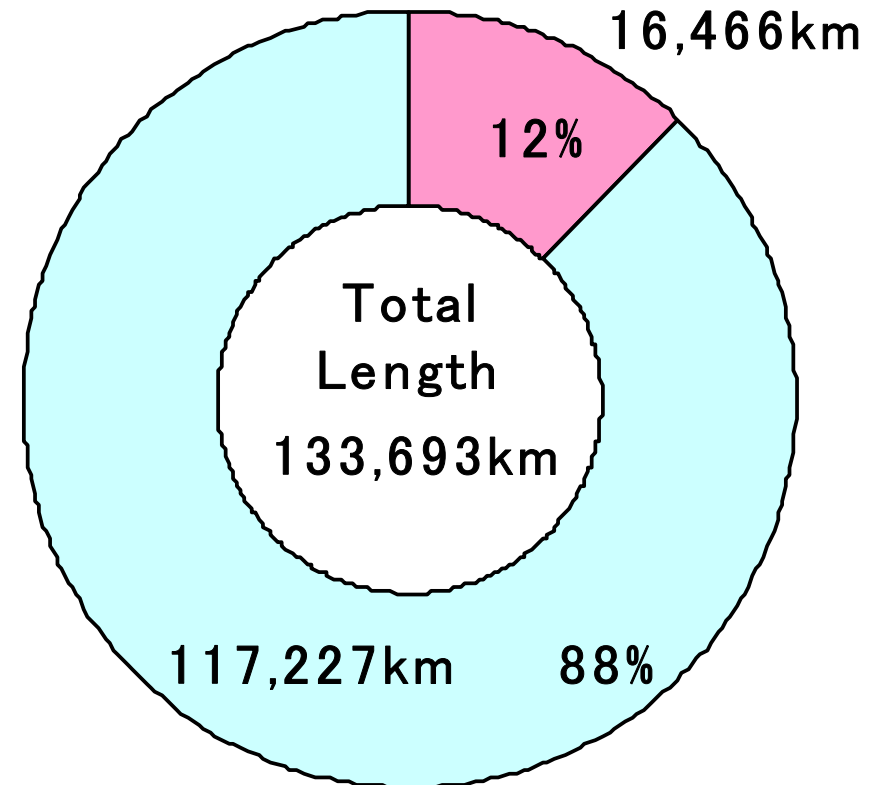
Road condition in 1950

Pavement Roads 6,186km



Gravel Roads

Impassable of Motor Vehicle 16,466km



Passable of Motor Vehicle

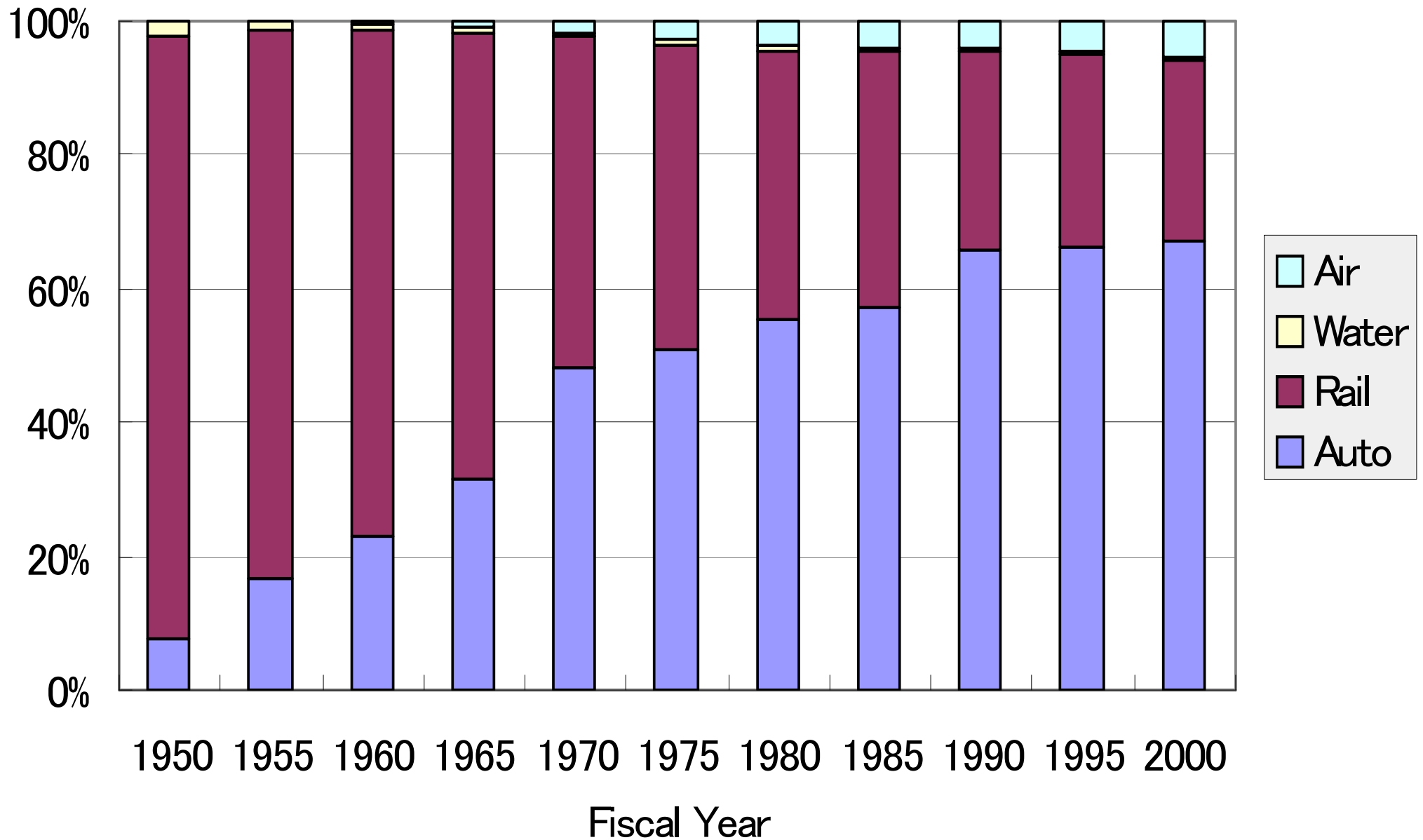
Source: Road Statistics 1952, Road Bureau, Ministry of Construction

*“The roads of Japan are incredibly bad.
No other industrial nation has so completely
neglected its highway system.”*

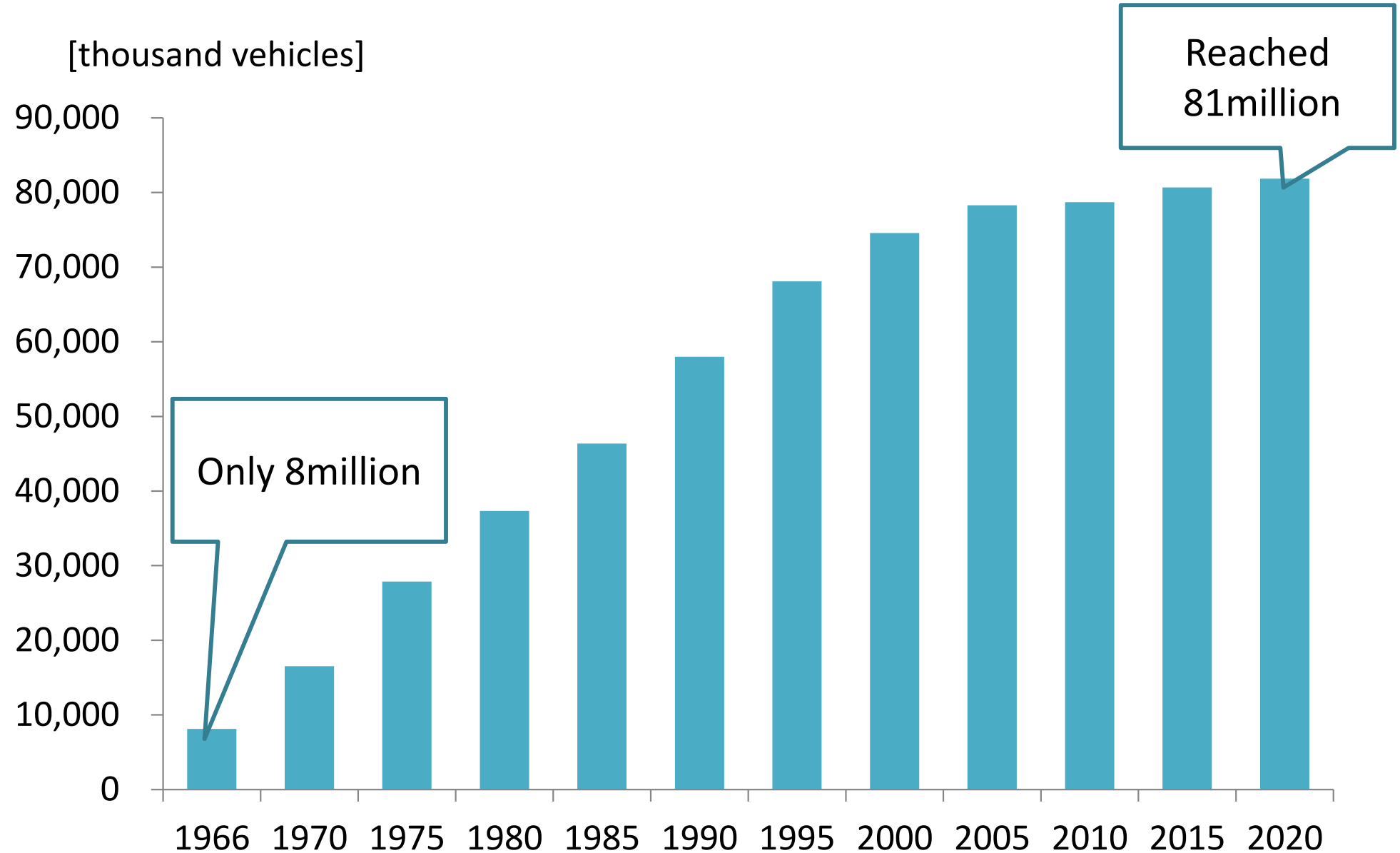


Source: Hagen, E. E, F. W. Herring, G. E. McLaughlin, W. Owen, H. M. Sapir, and R. J. Watkins (1956),
Report on Kobe-Nagoya Expressway Survey, Ministry of Construction.

Modal Shift from Railways to Automobiles



Number of Registered Vehicles in Japan



Source: Number of Registered Vehicles,
Automobile Inspection & Registration Information Association

Road Development Systems in the Era of Motorization in Japan

Three Pillars Promoted Road Development

1) System of Revenue Sources Earmarked for Road Improvements

2) Planned Implementation by the Five-Year Plan for Road Construction

3) Establishment of Toll Road System



The construction of expressways was needed to cope with the rapid motorization and as a way to make road transportation, which was the bottleneck of economic recovery, more efficient.

2. Toll Road System in JAPAN



Higashi-Osaka Junction

Toll road system in Japan

concept

- The road should be open to the public for free.



But, only of tax revenue was insufficient to cover the cost of the needed road development.

- The toll road system

- ... A means of covering revenue shortages, funding maintenance costs and repaying construction loans
- ... The system collects toll fees from users, who utilize specific roads.



Toll road system in Japan

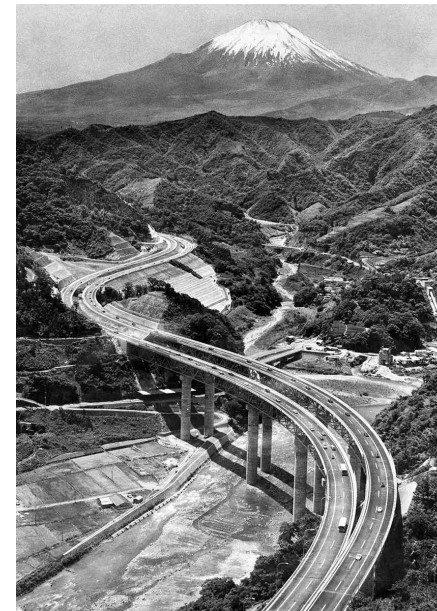
history

- 1952: Enactment of the former “Law Concerning Special Measures for Highway Construction”
 - *Introduction of “loans” for compensation for the shortage of source of revenue*
 - *Introduction of the “toll road system” (Overseer: State, Local Public Bodies)*
- 1954: Establishment of the 1st “Five-Year Highway Development Plan”
 - *Road improvement*
 - *Funds for public works*

Toll road system in Japan

history

- 1956 : Enactment of the current “Law Concerning Special Measures for Highway Construction”
: Foundation of Japan Highway Public Corporation
→ *JH became a main body of toll road projects*



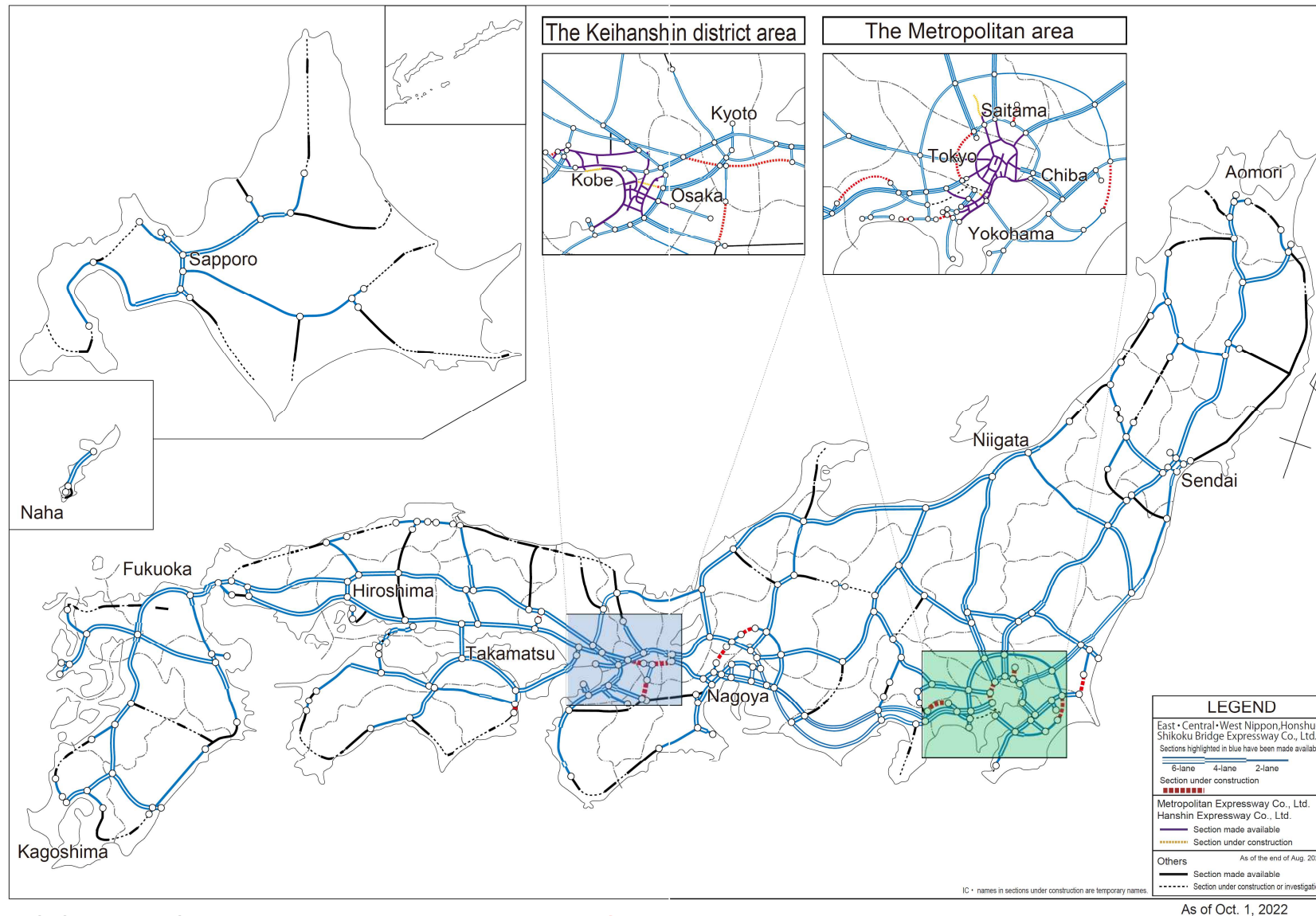
Toll road system in Japan

history

- 1959 : Establishment of the Metropolitan Expressway Public Corporation
- 1962 : Establishment of the Hanshin Expressway Public Corporation
- 1970 : Establishment of the Honshu-Shikoku Bridge Authority
- : Enactment of the Law Concerning Local Road Public Corporation
 - *Permitting establishment of a local road public corporation to construct regional arterial toll road.*



Toll Expressway Network in Japan



- Total length is approx. **10,400km**
- **6 companies** operate and manage the expressways
- Traffic volume is nearly **9 million** vehicles per day

Privatization of road companies in 2005

In October 2005, 4 road-related organizations were divided into 6 companies, which was founded and privatized.

e.g. Hanshin Expressway **Public Corporation** → Hanshin Expressway **Company Limited**

Purposes of privatization



To guarantee the repayment of the combined debt of the construction costs and the interest



Constructing essential expressways at the lowest cost



Providing rational and flexible toll and service

Privatization Scheme

Japan Highway Public Corporation

Metropolitan
Expwy Public
Corporation

Hanshin
Expwy Public
Corporation

Honshu-
Shikoku Bridge
Authority



[Companies] Construction, renewal and management of expressways and collection of tolls



[Agency] Holding of expressways
and repayment of debts

Japan Expressway Holding and Debt Repayment Agency
(JEHDRA)



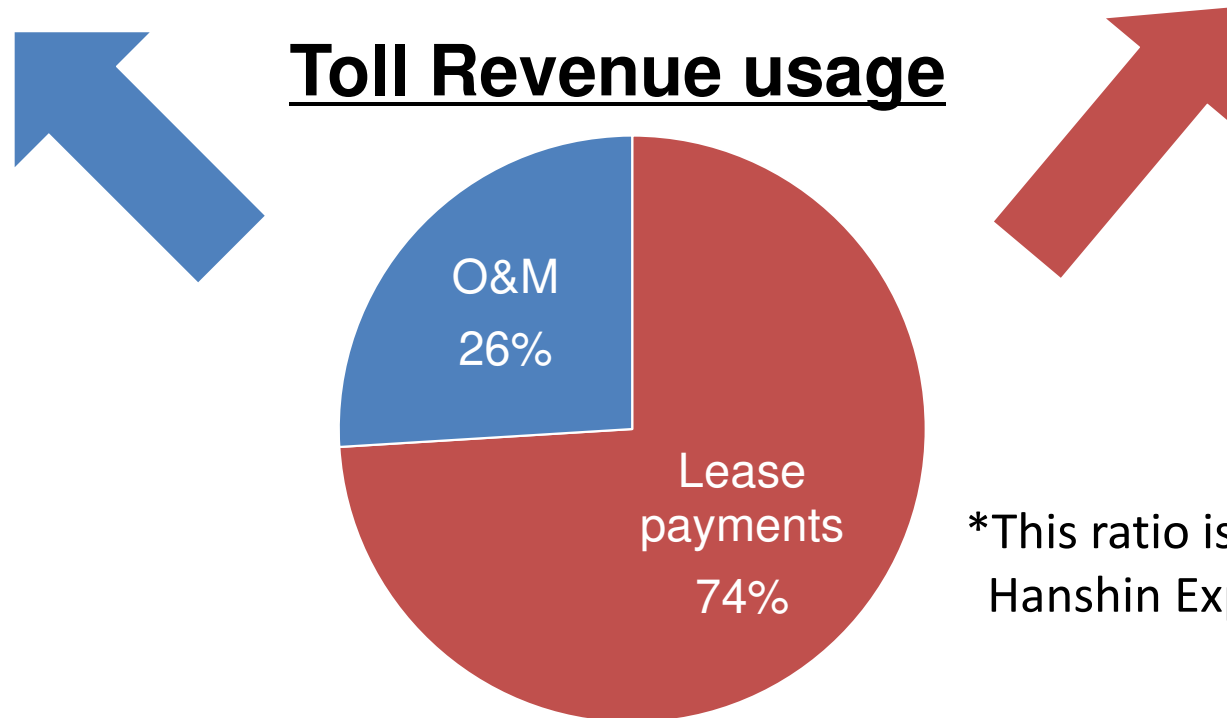
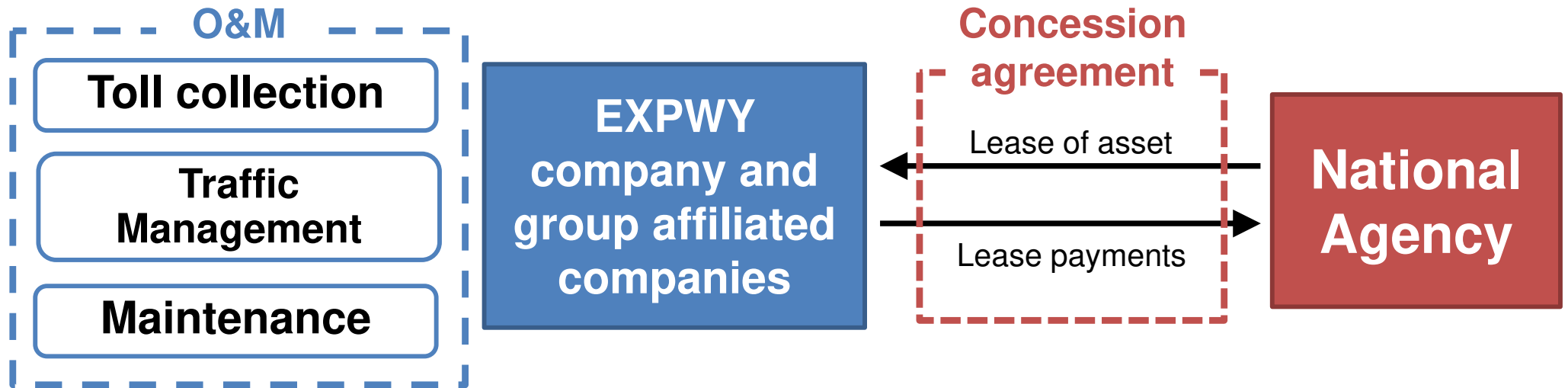
Toll Expressway Project Sequence



- Finance procurement by EXPWY company
- Engineering procurement by EXPWY company
(Construction is contracted out by EXPWY company.)
- Ownership of road asset from EXPWY company to National Agency
 - * After construction completion
- O&M by EXPWY company
- Toll collection by EXPWY company
- Lease fee payment of road asset from the EXPWY company to National Agency for debt repayment by EXPWY company

*National Agency: Japan Expressway Holding and Debt Repayment Agency

BTO – Japanese system



*This ratio is an example of Hanshin Expressway

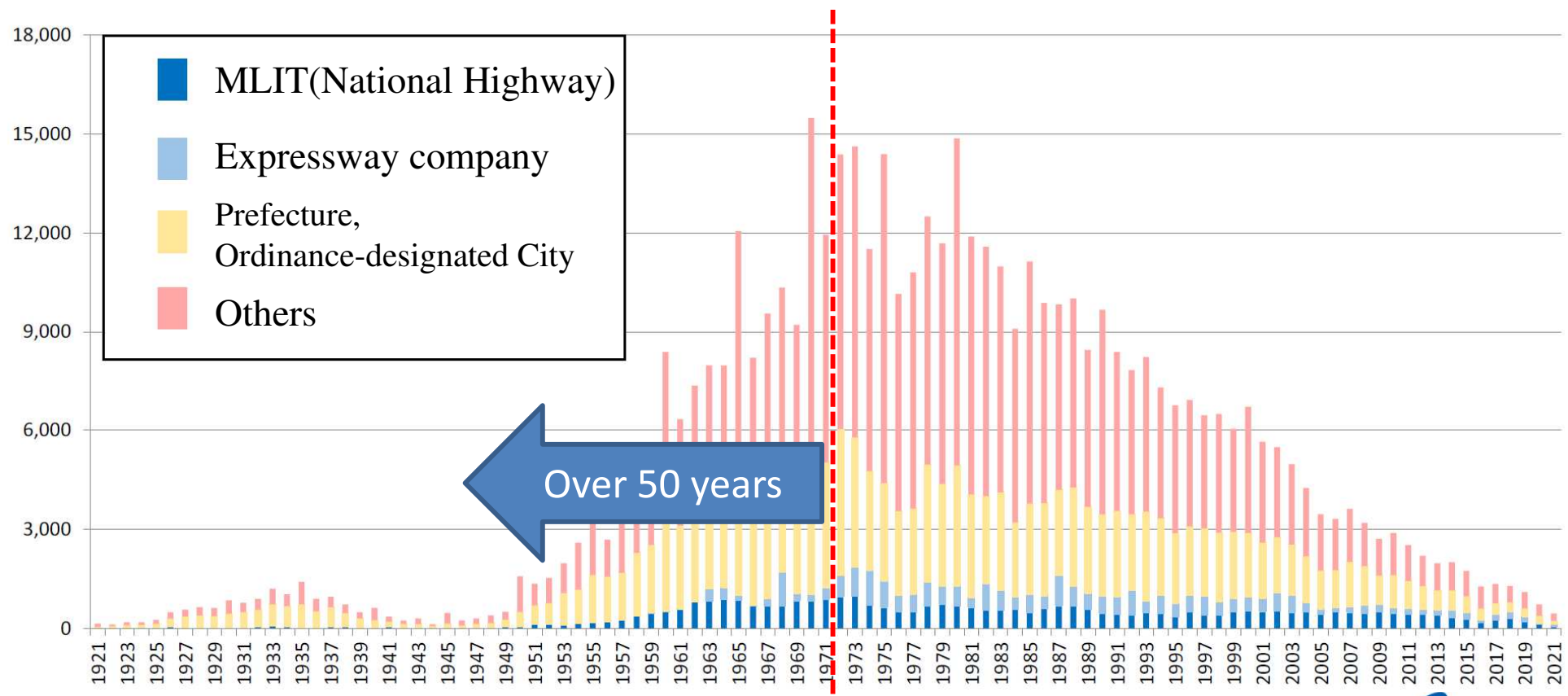
3. Renewal Project of Expressway



Nishi Semba Junction

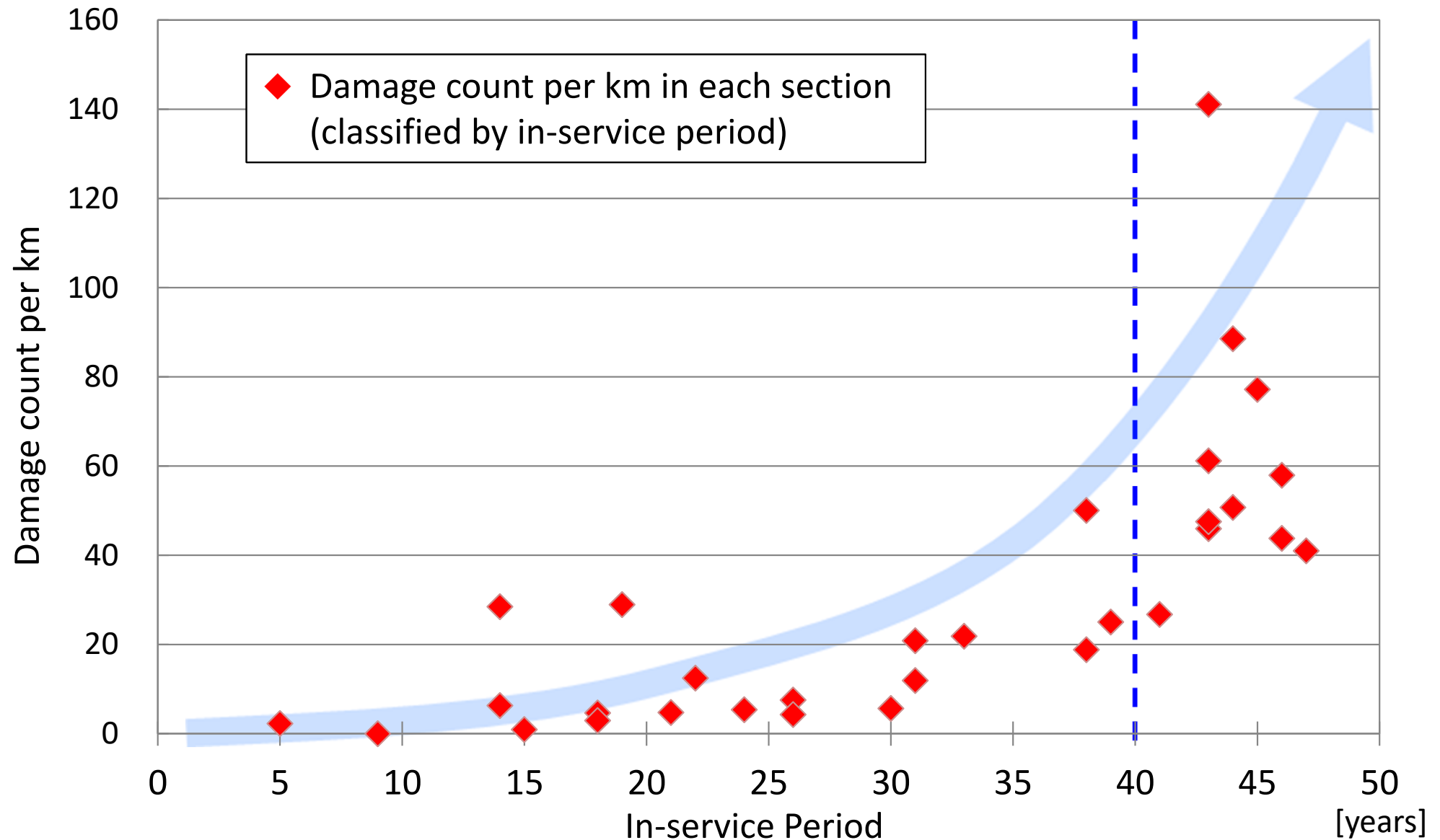
Ailing Road Structures in Japan

- There are about 730,000 bridges registered. (Out of 26% is more than 15m of length)
- As of 2022, 34% is more than 50 years old, and the share will be increased to 59% in 10 years.



Source: Annual Road Maintenance Report (2022), Ministry of Land, Infrastructure, Transport and Tourism

Accelerated Deterioration of Structures



- ✓ There is a general trend that the speed of damage deterioration of bridge structures gets faster after 40 years

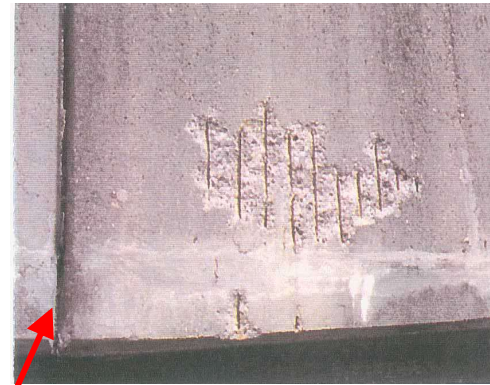
Typical Cases of Structural Damages



Deterioration of paint



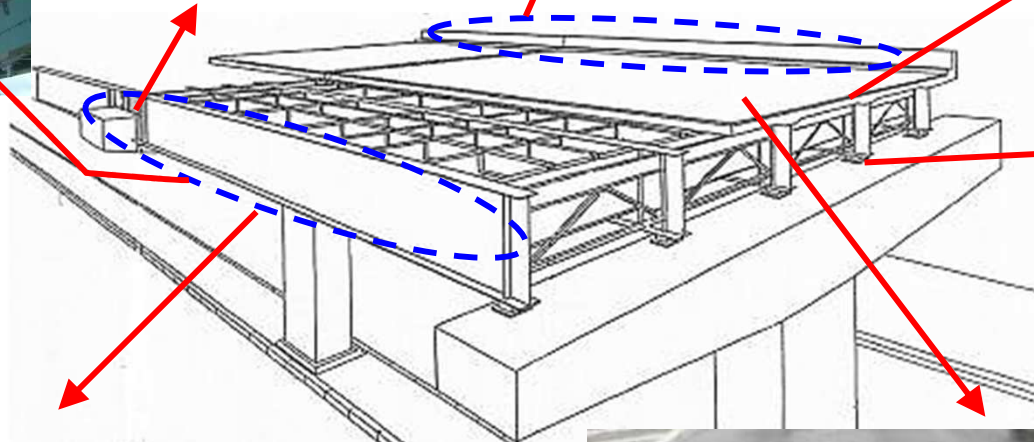
Corrosion of steel girder



Damage of concrete railing



Damage of expansion joint



Rust of metal bearing



Crack of concrete girder



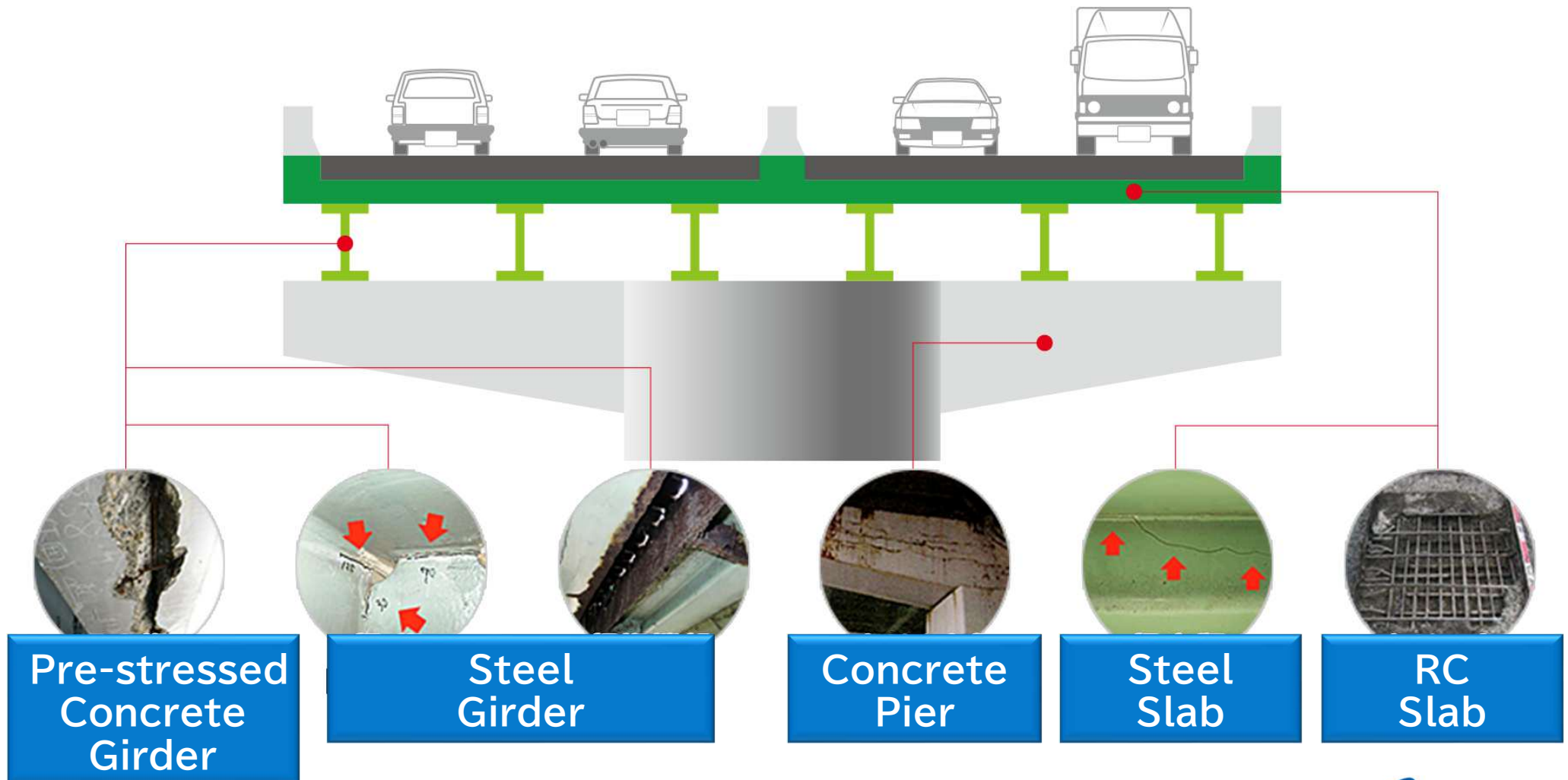
Deterioration of pavement



Renewal Project started in 2015



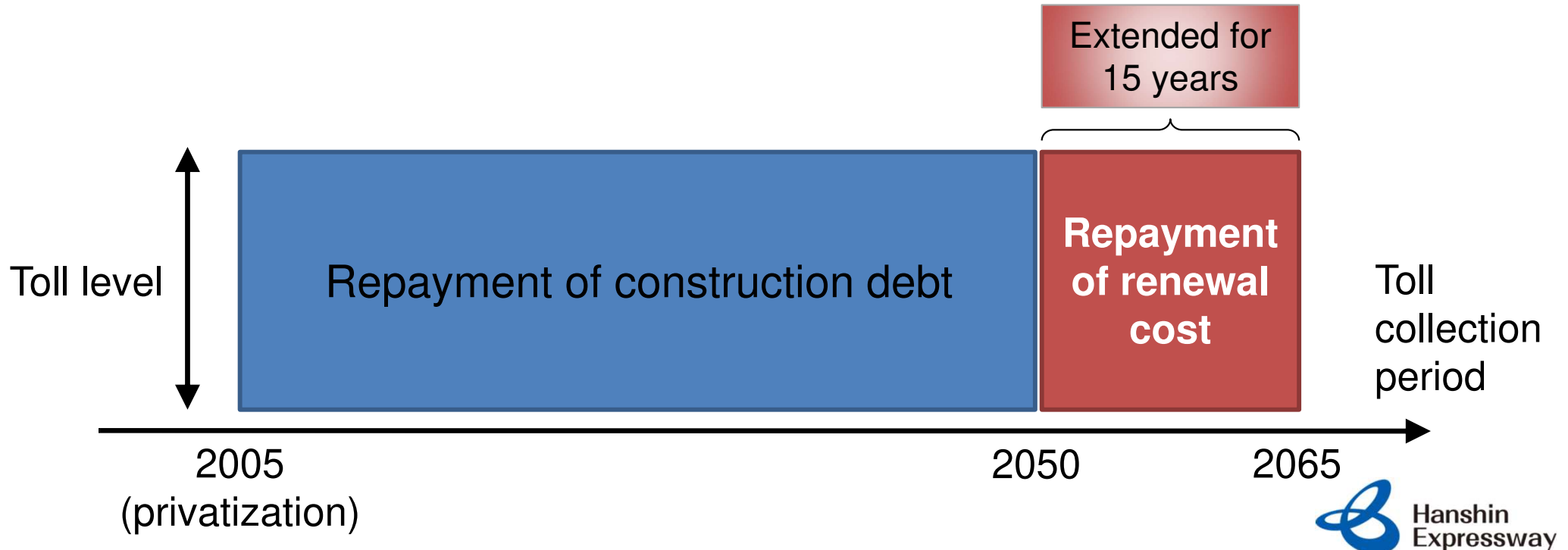
The Large-scale Replacements & The Large-scale Repairs



Funds of Renewal Project

The cost necessary for the renewal project is to be borne by users of the expressways.

⇒ *The expiration date of toll collection period has been extended for 15 years from 2050 (45 years from the establishment of the company) to 2065.*



4. Outline of Hanshin Expressway



Tempozan Bridge and Tempozan Junction

Company Profile

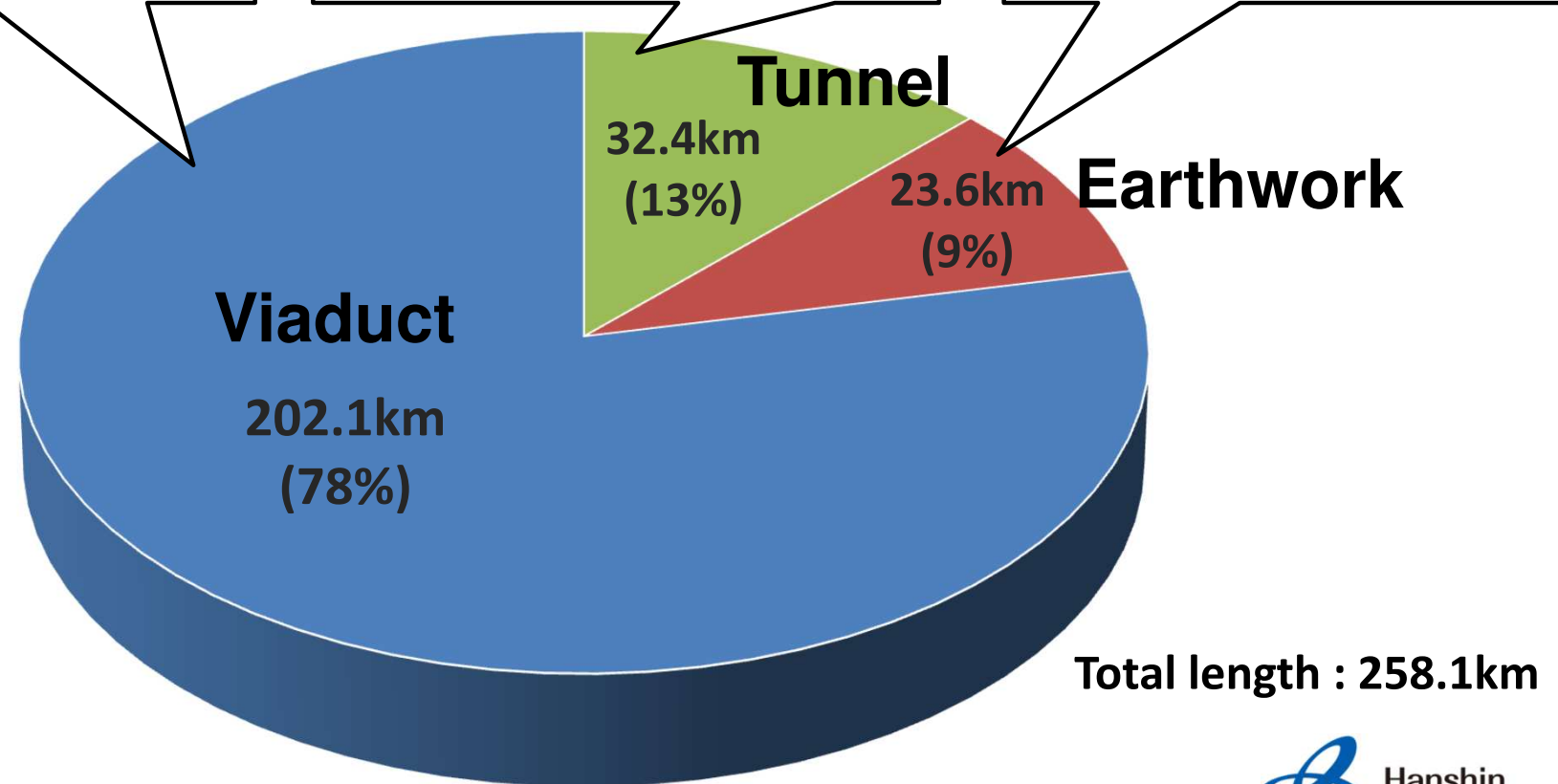
Established	<p>【Established as the Hanshin Expressway Public Corporation】: 1st May, 1962</p> <p>【Privatization】: 1st October, 2005</p>
Business Activities	<ul style="list-style-type: none"> • Construction and upgrading of expressways • Maintenance, repair and other management of expressways • Management of expressway parking areas and other facilities • Construction, maintenance, surveying, and other types of work on expressways under contract with national and local public agencies
Operation	258.1km
Construction	26.5 km
Traffic Volume	683,259 vehicles / day (JFY 2021)
Toll revenue	JPY 170 billion / year (JFY 2021)
Capital	JPY 10 billion
Employees	Approx. 700 (2022.3)



Hanshin Expressway Network



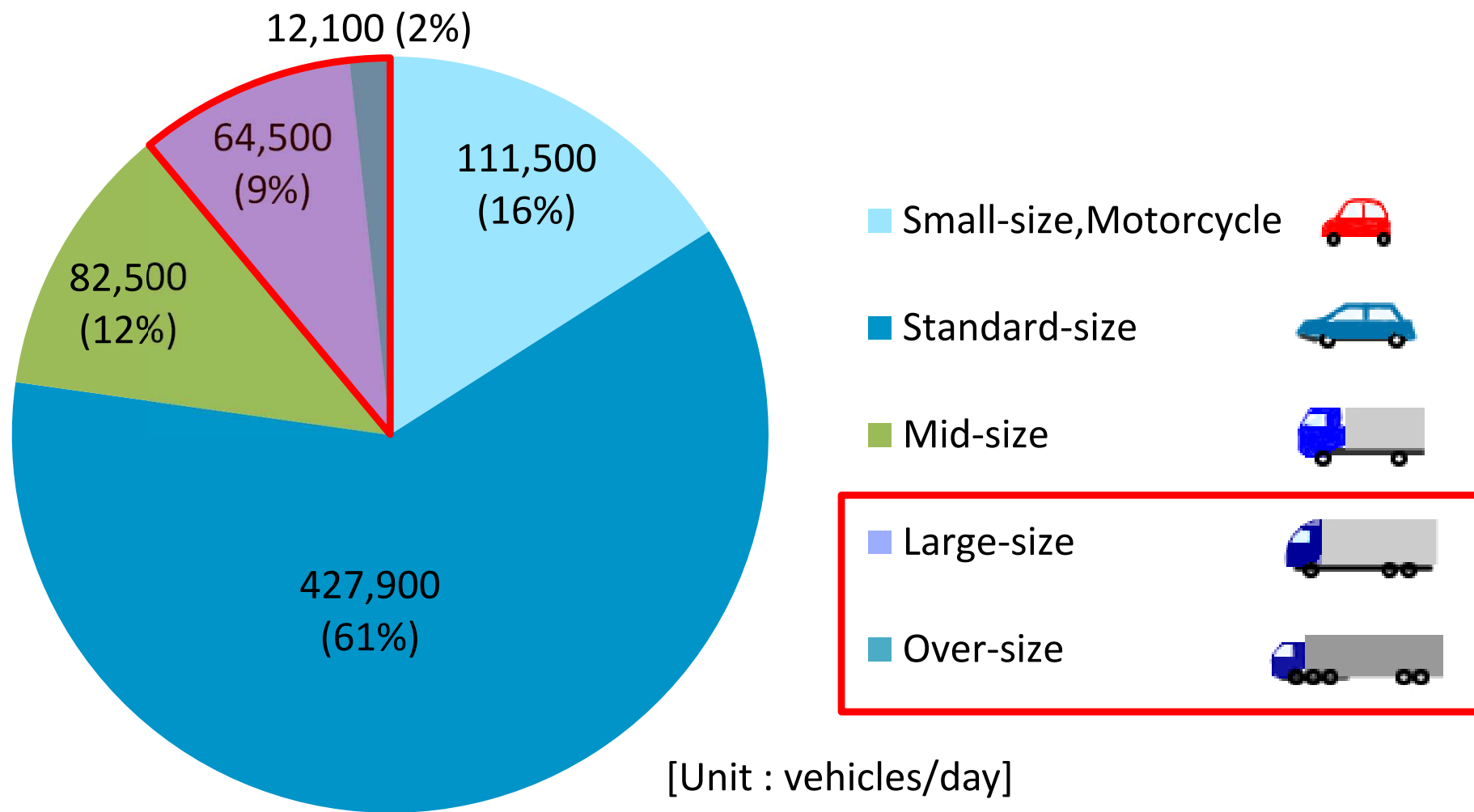
Structure Type in Hanshin Expressway



Source: Maintenance Handbook (2020), Hanshin Expressway Co.,Ltd.

Traffic Volume by Vehicle Categories

Daily traffic volume in April 2022



Source: Traffic volume records by vehicle type, *Hanshin Expressway Co., Ltd.*
(<https://www.hanshin-exp.co.jp/company/kigyou/data/data2.html>)

Hanshin Expressway Overviews



Higashi Semba Junction

Viaducts in highly urbanized area go along the river, over the city streets.



Nakanoshima Junction

Hanshin Expressway Overviews



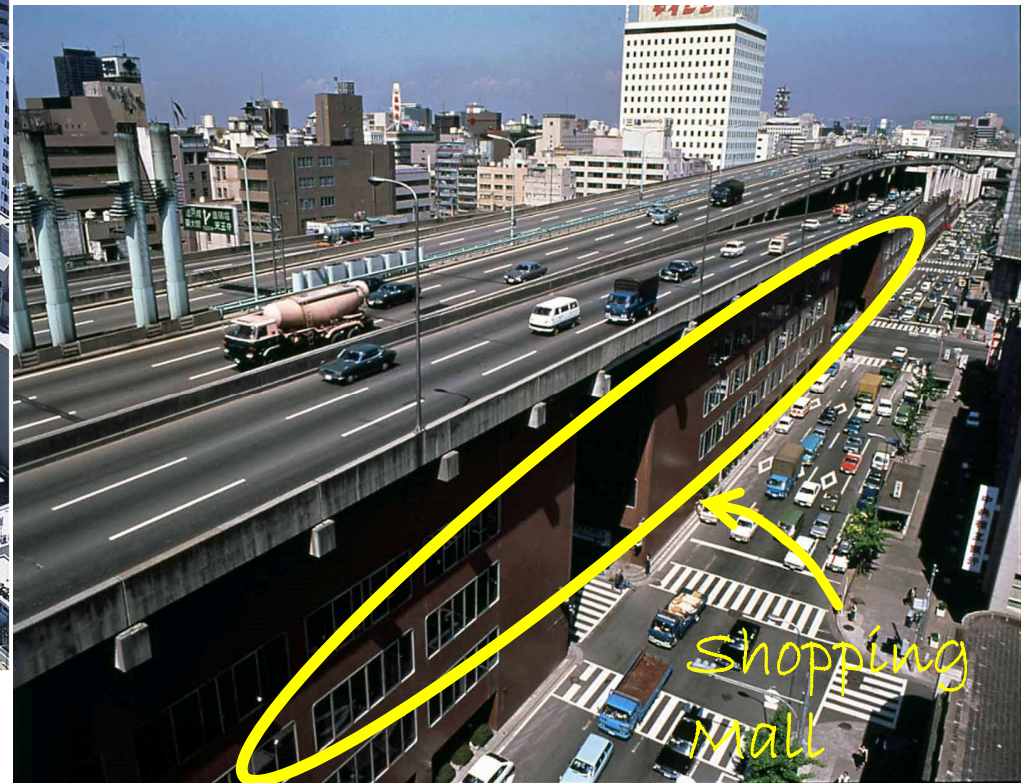
Hanshin Expressway has constructed and also manages various types of long span bridges.

Hanshin Expressway Overviews



Umeda Off-Ramp

“Air Space Utilization System”



Semba Center Building

Hanshin Expressway has promoted an effective urban space utilization to reallocate urban space between expressway projects and urban amenity services.

Five Subsidiaries Work as a One Group

*Hanshin Expressway Toll Osaka Company Limited,
Hanshin Expressway Toll Kobe Company Limited*

- Toll collection operation



Hanshin Expressway R&D Company Limited

- Survey & Analysis
- Design
- Cost estimation
- Development & Operation of systems



▶ [Link](#)



Hanshin Expressway Service Company Limited

- Parking area operation
- Management of parking lots
- Thruway credit card service



Hanshin Expressway Engineering Company Limited

- Inspection
- Repair work



Hanshin Expressway Traffic Patrol Company Limited

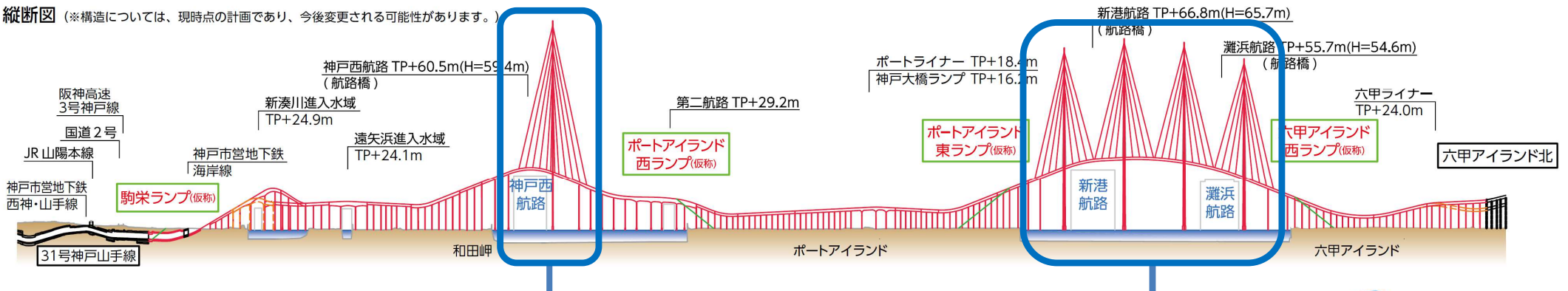
- Patrolling
- Traffic monitoring



Osaka Wangan Road Construction Project



縦断面図 (※構造については、現時点の計画であり、今後変更される可能性があります。)



Kobe-Nishi Channel Bridge*

Shinko-Nadahama Channel Bridge*

*All bridge names are tentative.



Intensive Maintenance Work with all Lane Closure



- **Implemented since 1973 on one route per year**
- **Closed all lanes for around 10 days on off-peak season**
- **A practical solution for reducing work-caused congestion**

Intensive Maintenance Work with all Lane Closure

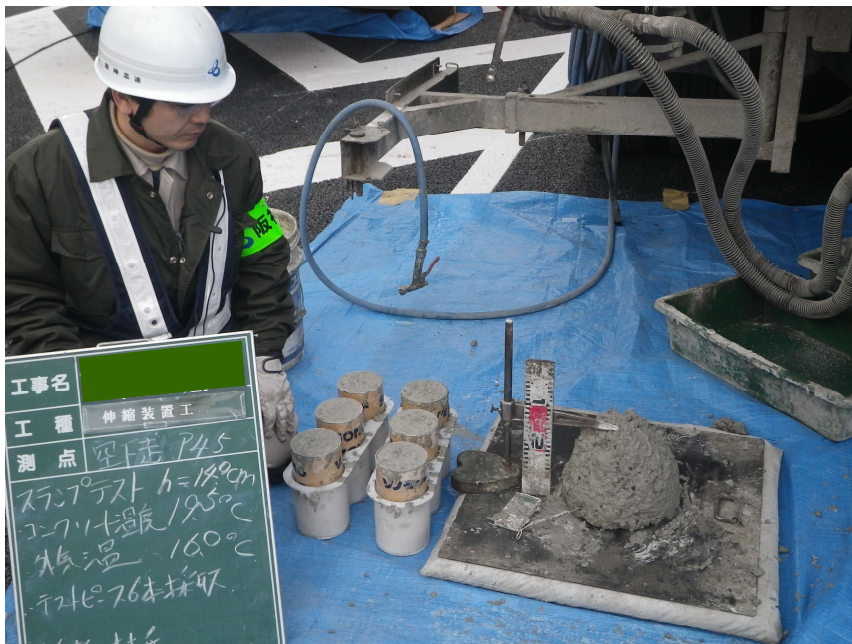


Major works are re-pavement and replacement of expansion joints.

Intensive Maintenance Work with all Lane Closure



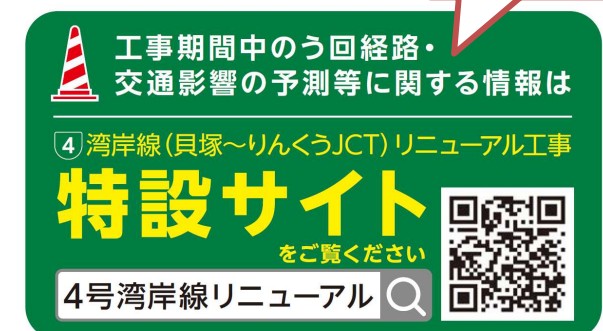
- Work schedule coordination and daily toolbox meeting with contractors
- 24 hours basis supervision
- Public relations through various media



Leaflet



Website



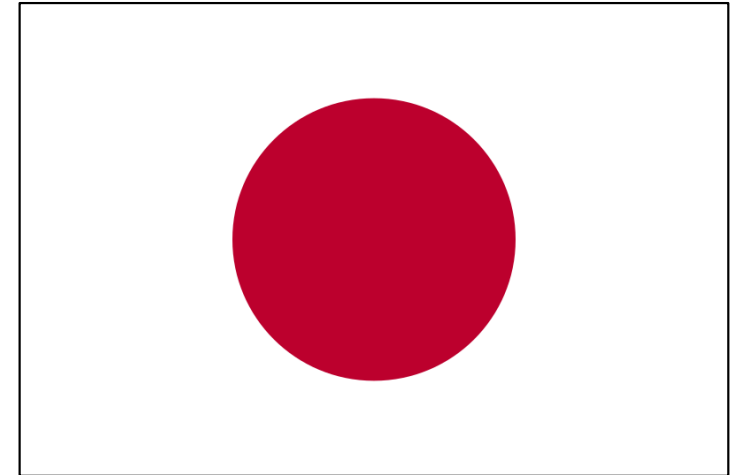
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**Barabara ni maisha.
Barabara nzuri, maisha mazuri.**



**Asante sana, harambee pamoja
Kenya na Japan!**