

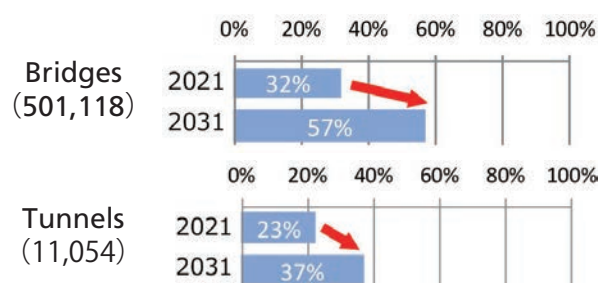
# Preventive maintenance measures to aging road

## - Safe and secure roads for the next generation -

Based on the lessons learned from “America in Ruins”, we have a responsibility to protect the safety and security of roads and to pass on reliable infrastructure to future generations. In order to make an early transition to maintenance based on preventive maintenance that reduces life-cycle costs and achieves efficient, sustainable management, we will accelerate measures for facilities that require repair as identified by periodic inspections and promote the active use of new technologies.

## Increasingly serious aging of infrastructure

The percentage of infrastructure facilities that are more than 50 years old is increasing at an accelerating rate.



Facilities that are more than 50 years old

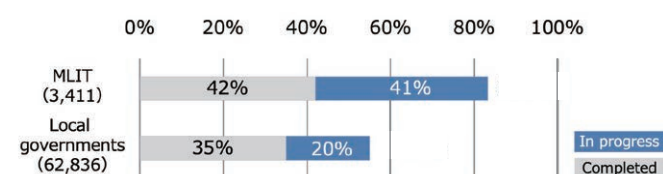
\* ( ) is the number of bridges and tunnels covered, excluding bridges and tunnels where year of construction is unknown.



Judgment category IV (urgent measures should be taken)

## Implementation status of repairs and other measures for bridges with judgment categories III and IV

As of 2020, 42% of bridges repaired by the MLIT and 35% of bridges repaired by local governments in the first round of inspections in the five years since 2014 are in a condition that requires early or urgent action (judgment category III or IV).



\* The target is facilities that were diagnosed as Category III or IV among facilities that underwent the first round of inspections from FY2014 to FY2018. (This does not include facilities that were newly diagnosed as Category III or IV after the second period of inspections.)

## America in Ruins

In the 1980s, the U.S. was unable to cope with the aging of road structures that were built in large numbers in the 1930s, and accidents involving damage to bridges and elevated roads resulted in massive traffic detours, which had a major impact on various aspects of the economy and people's lives.



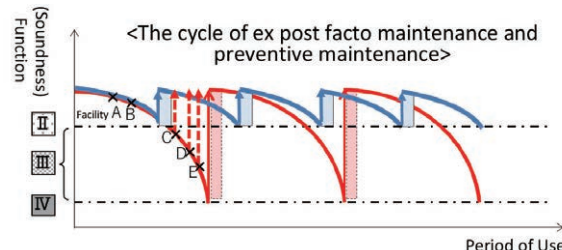
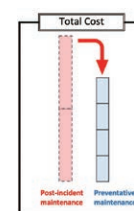
The Brooklyn Bridge's sidewalk closed down after a cable cutting accident. (Taken from “Highways and Automobiles, November, 1981.



Collapse of the Maianas Bridge (1983)

## Medium- to long-term cost reduction through preventive maintenance

In order to shift to maintenance management based on preventive maintenance, and to reduce and equalize total costs over the medium and long term, it is vital to take early action on facilities that require early or urgent action (judgment categories III and IV).

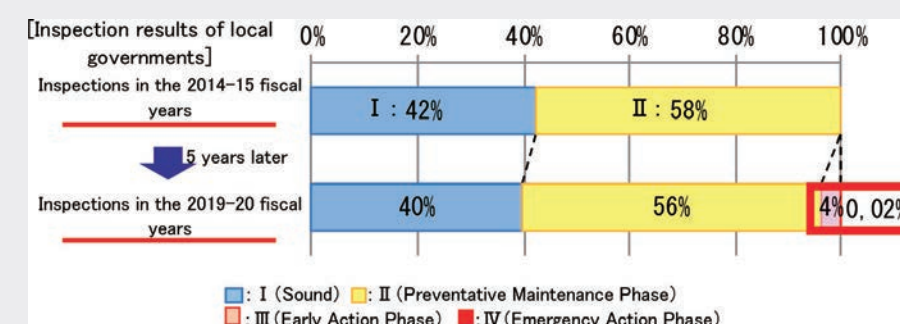


## Realization of sustainable road management

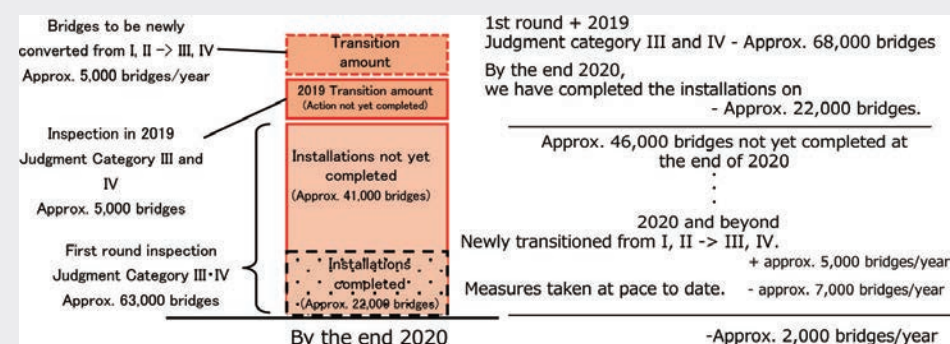
For facilities managed by local governments, we provide systematic and intensive financial support to the measures based on “Long-Life Repair Plans” by utilizing subsidy system for road maintenance projects, and technical support such as direct diagnosis and repair services on their behalf.

### Background / data

- The rate of repair measures for bridges on roads managed by local governments that require urgent or early maintenance is about 51%(FY2020).
- The percentage of bridges that transitioned from the first round of inspections (2014-15) to the second round of inspections (2019-20) to a state that requires early or urgent action is 4%.



- About 7,000 bridges are repaired annually by local governments, and about 5,000 bridges are expected to need new repairs in the future.



## Financial and technical support for local communities

Provide financial support to local governments through the Road Maintenance Project Subsidy Program

- Promote the shift to preventive maintenance by providing systematic and intensive financial support for facilities that require early repair and other measures
- In order to promote the use of new technologies, the subsidy system for road maintenance projects will require the consideration of the use of new technologies, and will give priority to projects that use new technologies and local governments that specify numerical targets [Ref. 1] for cost

reduction in their long-life repair plans

- Support for the bundling, functional reduction and removal of aging bridges in order to reduce medium- to long-term maintenance and management costs

## Technical support for local communities

Technical support provided by the government, including repair services and training on repair.

- The rate of repair measures for bridges that require urgent or early action on roads managed by local governments. (2019→2025) : Approx. 34% → Approx. 73%
- The number of those trained in maintenance and management at local governments. (2019→2025) : 6,459 → 10,000

Ref. 1: Directly managed diagnoses (2014-2020): 16 areas, repair and maintenance (2015-2020): 14 areas



# Realization of sustainable road management

In addition to normal repairs, we will provide support for the consolidation, removal, and reduction of functionality of aging road facilities that can be replaced.

In addition to the intensive repair of pavements where vulnerability of the roadbed has been confirmed through periodic inspections, the use of concrete pavement in the right places will be promoted.

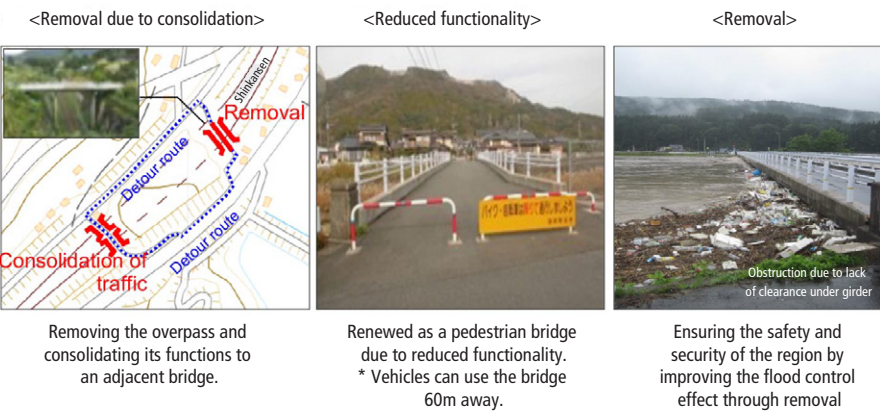
## Support for consolidation, removal, and reductions of functionality

### Background / data

- Only 20% of municipalities have considered consolidation, removal. (as the end of FY2020)
- In 2021, 96 bridges managed by local governments were scheduled to be consolidated or removed.

Support measures for the removal of old road facilities that can be replaced through the road maintenance project subsidy system.

- Support Contents
- Removal due to consolidation [Ref. 1]
  - Removal to ensure the safety of pedestrians, passing vehicles. [Ref. 2]
  - Removal of bridges with high flood control effect [Ref. 3]
- Percentage of local governments considering consolidation, removal, or functional reductions of facilities: (2019 -> 2025): 14% -> 100%



## Measures to prevent aging of pavement

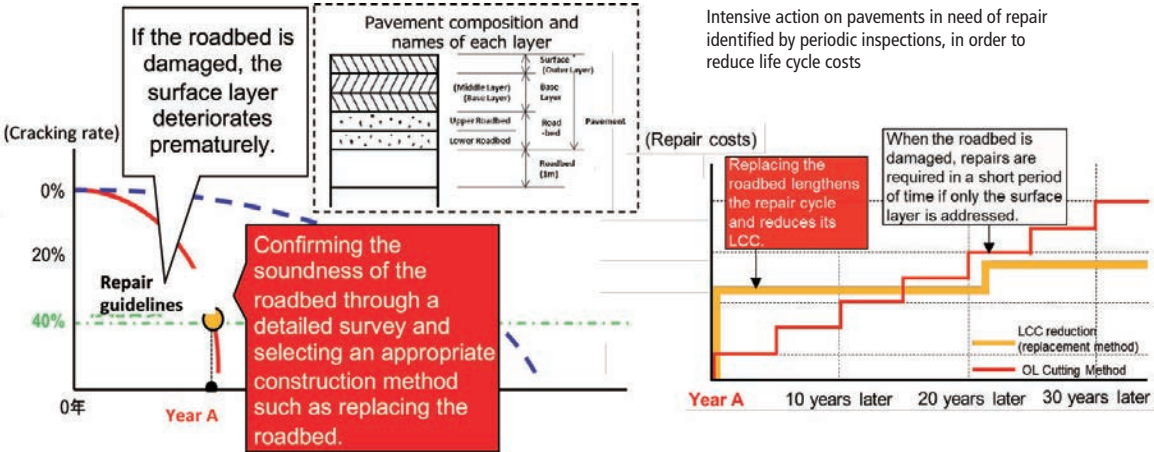
### Background / data

- Pavements in need of repair are about 5,900 km for national highways under jurisdiction of MLIT and about 8,900 km for local roads, of which about 15% have already started repair work (as of the end of FY2020).

Reduce lifecycle costs by intensively repairing pavements where vulnerability of the roadbed has been confirmed through periodic inspections and by utilizing concrete pavement in the right places.

Rate of pavement repair on roads important for disaster prevention for pavements with damaged roadbed or lower layer (approx. 2,700km as of FY 2019).

### Image of life cycle cost reduction



Ref. 1: Only in the case of repairing structures at the aggregation site or reconstructing roads for detouring to the aggregation site.  
Ref. 2: Only when removal of structures and road reconstruction are carried out at the same time.  
Ref. 3: Only in the case where short-term numerical targets for removal and cost reduction effects are specified in a Long-Life Repair Plan.

# Realization of sustainable road management

We will engage in systematic large-scale renewal of expressways managed by expressway companies.

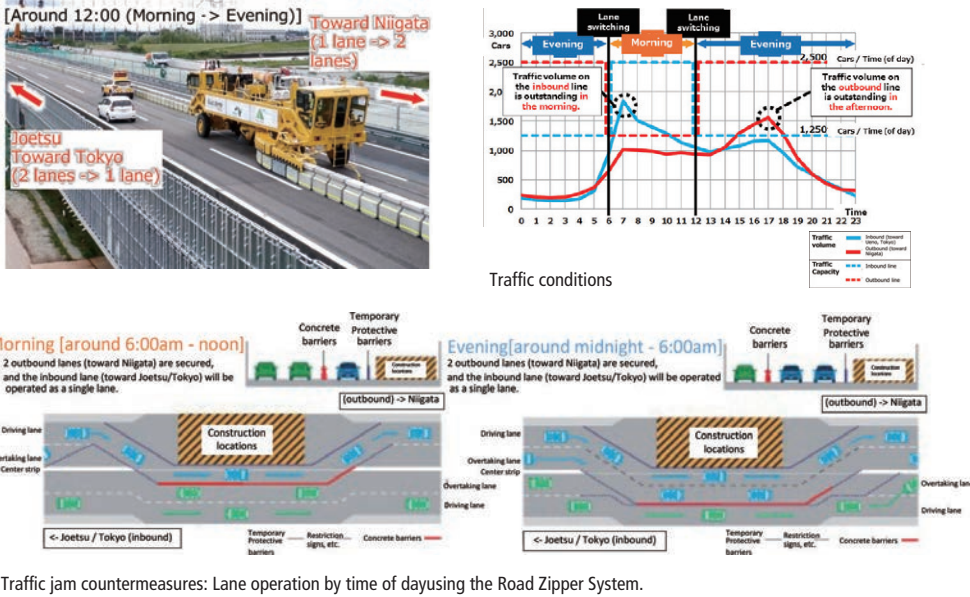
### Background / data

- Status of road closures related to specific renewals (2020, six companies in total):  
All-day road closures (main line): 4 locations, total of 39 days  
Two-way traffic restrictions: 35 locations for a total of 2,606 days

Promote renewal projects in a systematic manner while minimizing the social impact of traffic restrictions by promoting the use of new technologies.

Reduce congestion caused by the construction restrictions by the use of the road zipper system and the operation of the lanes according to the congestion periods as the peak traffic periods for morning and evening commuting traffic differ between the upstream and downstream.

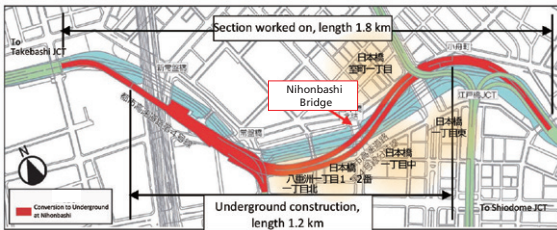
### Example : Hokuriku Expressway (Nakanoshima Mitsuke IC - Sanjo Tsubame IC) Sakae Bridge and Kaigui River Bridge Floor Slab Replacement



## Efforts to develop the Metropolitan Expressway underground in cooperation with urban development

In addition to measures for the aging of the Metropolitan Expressway, we will also work to improve its functionality by widening its shoulders and will collaborate with private redevelopment projects such as the revitalization of the waterfront area around the Nihonbashi River and the development of a business hub in the city center. [Ref. 1]

### Plan to move the Nihonbashi area of the Metropolitan Expressway to underground



### Image of the Nihonbashi area before and after underground construction



\* Based on current information regarding redevelopment plans.

Ref. 1: City planning changed in October, 2019, project approved in March, 2020, construction started in November, 2020, underground route scheduled to open in 2035, elevated bridge scheduled for removal in 2040



## Realization of sustainable road management

Improve the efficiency and sophistication of periodic inspections by proactively utilizing new technologies and organizing optimal inspection methods for each part and component.

Promptly develop technical standards necessary for the introduction of new technologies in order to save labor and reduce costs in maintenance and management.

### Background / data

- To promote the use of technologies that complement, substitute, or enhance close visual inspection, a list of the performance of inspection support technologies was prepared to serve as a reference [Ref. 1] for making decisions when using such technologies.

## Improvement of efficiency and sophistication of periodic inspections

Expand the inspection support technology performance catalog [Ref. 1] and organize optimal inspection methods for each part and component to Improve the efficiency and sophistication of periodic inspections.

- Number of technologies published in the performance catalog of inspection support technologies:  
(2020 -> 2025): 80 -> 240 technologies
- Percentage of local governments that used new technologies in bridge and tunnel inspections out of local governments that considered using new technologies in bridge and tunnel inspection:  
(2019 -> 2025) Bridges: 39% -> 50%, Tunnel : 31% -> 50%

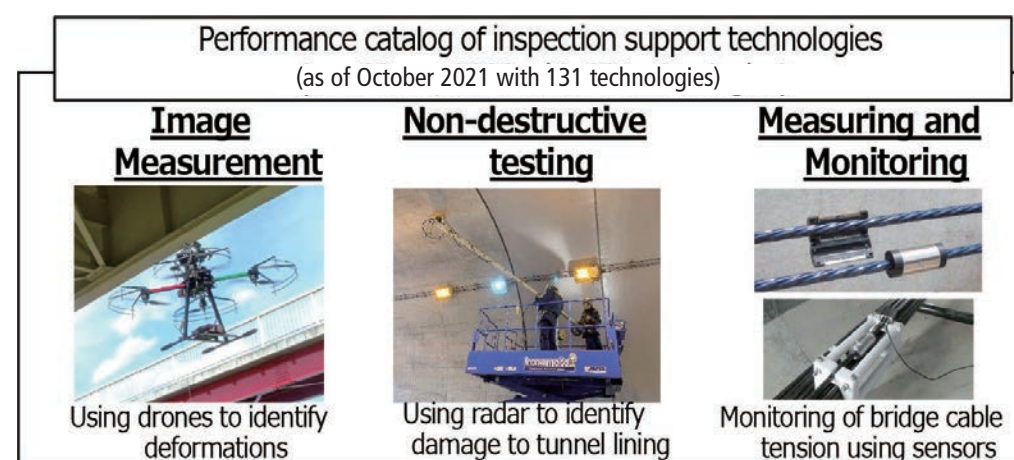
## Introduction of new technology and new materials

Promptly develop necessary technical standards for the introduction of new technologies and materials

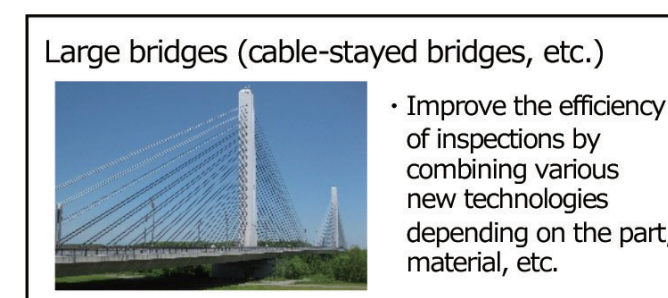
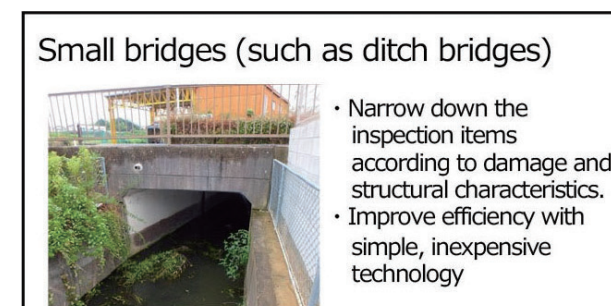
Focused support for the use of new technologies and materials in the road maintenance project subsidy system.

## Improvement of efficiency and sophistication of periodic inspections

- Expand the technologies listed in the performance catalog of inspection support technologies



- Conduct inspections using a combination of technologies best suited to the purpose.



## Introduction of new technology and new materials (example of tunnel lining technology)

- Study on the introduction of lining technology to reduce the occurrence of peeling.

