Training use only

FY2025 JICA Training:
Road Operations and Maintenance

Operating and Maintaining National Highways

October 2025

Department of Development and Construction
Okinawa General Bureau
Cabinet Office, Government of Japan

Please note

This text has been prepared with additions and modifications based on training materials provided by the Kanto Regional Development Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, and should be handled with care.

1. Purpose of road management
2. Daily management
3. Road structures and equipment
4. Disaster management
5. Trends in Road Management
6. About the Okinawa General Bureau

1. Purpose of road management

Purpose of road management

Responsibilities of road administrators

Article 42 of the Road Traffic Act states that road administrators must work to maintain and improve roads in order to keep them in good condition at all times so as to prevent hindrances to general traffic flow.

Definition of road management

Actions that road administrators take to ensure general traffic flow can be divided into *supportive* action that promotes essential road functions (new construction, upgrades, maintenance, and repairs so that roads can serve their core purpose) and *opposing* action that prevents, removes, or otherwise restricts obstacles to that purpose).

Purpose of road management

Purpose of road management

1) Maintain facilities: Always keep roads in good condition
2) Maintain functionality: Make repairs before there is critical damage
3) Maintain the environment: Keep noise and vibration (e.g. due to bumpy roads) to a minimum

Key points

1) Find ways to eliminate and prevent factors causing defects and/or damage
2) Quickly identify defects and/or damage and take stopgap measures as needed. Use the opportunity to put full restoration measures in place.

Purpose of road management

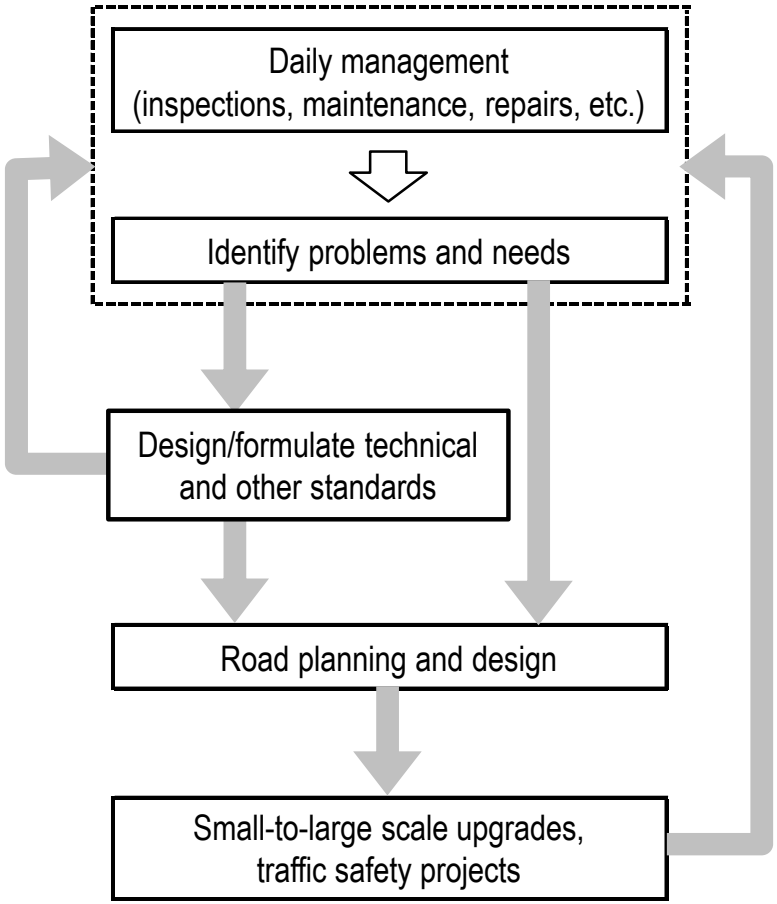
Definition of road management

Keeping the entire road network in optimum condition while preventing hindrances to general traffic flow (see note)

➢ Maintaining a high standard of service

Specific examples of road management

- Identifying road conditions (traffic flow, surrounding environment, etc.)
- Exercising authority (zoning, accounts, permission to occupy, permits for special vehicles, etc.)
- Maintenance (patrols, weeding, cleaning, daily repairs, etc.)
- Repairs and improvements (disaster prevention, bridge reinforcements, bridge repairs, pavement repairs, etc.)
- Disaster recovery
- Road safety projects (intersection upgrades, sidewalks, etc.)
- Reconstruction (bypasses, road widening)
- New construction



- **Road administrators get a clear understanding of on-site conditions and then put together plans designed to keep the entire network safe and well-functioning. These plans are then executed in the form of road management.**

Note: Broadly defined (national land management), narrowly defined

Major road management tasks (1)

■ Daily management

Inspect pavement, guardrails, and other fixtures for damage.
Workers also test for potholes under the road surface.

When abnormal conditions are found, traffic is stopped and repairs are carried out as soon as possible.

■ Structural repairs

Carry out inspections and repairs designed to maintain and extend the life of bridges, tunnels, and other aging facilities and structures.

Major road management tasks (2)

Coordination and consultation

- Review applications for special vehicles, occupancy, and other permits, coordinate with related parties, etc.

- Respond to complaints and requests from those living along roadways (hold information sessions and similar events)

Disaster response

Quickly inspect conditions (such as water depth during heavy rains) and take steps to ensure site safety while informing drivers using road information signs and other means.

Response to large-scale disasters

- **One of the challenges of road management is addressing situations (such as major disasters) whose resolution requires a concentrated investment of manpower over a short period of time.**
- **In September 2007, Typhoon #9 destroyed the Seisho Bypass. Workers were funneled in from outside the disaster area to help with rapid recovery. This kind of flexible, quick response is characteristic of national road administrators, who manage a wide area and have access to extensive human and technical resources. A national system helps give local municipalities a stronger feeling of safety and peace of mind.**

- The Regional Development Bureau sent in 138 workers between September 7–37
- To secure detours during the closure, the road administrator worked with NEXCO to eliminate tolls along the Odawara-Atsugi Road (September 10–27).
- The road was provisionally reopened 20 days after closure

2. Daily management

Road maintenance tasks (daily management)

Surface repairs

Surface cleaning

Gutter cleanouts

Trimming roadside vegetation

Weeding

Repairing lights

Management and maintenance standards (national roads)

Nationwide management and maintenance standards were established in FY2010. These were then revised as needed based on actual roadway conditions as well as feedback from local communities. The standards will continue to be reviewed as they are put into practice and data is collected and analyzed.

Through FY2009	FY2010	Current standards
Patrols • Daily (as a general rule)	**Patrols** • Once every two days (as a general rule)	**Patrols** • 50,000 or more vehicles per day • 5,000 or more, and less than 50,000 vehicles per two days • Less than 5,000 vehicles per three days
Cleaning • Road surface: 0–86 times a year (2008 figures) • Sidewalks: 0–20 times a year (2008 figures)	**Cleaning** • Within Japan's three biggest cities: 12 times a year (as a general rule) • Within densely inhabited districts (DIDs): Six times year • Other areas: once a year (generally not carried out aside from leaf removal)	**Cleaning** (rough guidelines given—carry out as needed depending on dust/dirt level) • Within Japan's three biggest cities: 12 times per year • Within densely inhabited districts (DIDs): 6 times per year • Other areas: once a year (Generally no implementation except for deciduous measures)
Weeding • 1–3 times a year (2008 figures)	**Weeding** • Once a year (as a general rule)	**Weeding** (carry out as needed in the following situations) • When safe travel cannot be ensured within the designated clearance of the structure • When drivers do not have sufficient visibility of pedestrians or traffic safety equipment
Trimming • Once every 1–3 years (2008 figures)	**Trimming** • Trees and shrubs: Once every three years (as a general rule) • Vegetation in planters: Once a year (as a general rule)	**Trimming** • About once every three years for trees and shrubs ※ However, set the appropriate frequency based on differences in growth rate depending on trees and the placement of trees. • Planting: about once a year
Snow removal • Remove when there has been 5–10 cm of snowfall • No uniform standards for antifreeze distribution	**Snow removal** • Remove when there has been 5–10 cm of snowfall • Standardize antifreeze distribution amounts	**Snow removal** • To avoid large-scale traffic closures and to maintain a certain amount of travel speed • Standardize antifreeze distribution amount guidelines • Snowfall of new snow about 5-10cm is removed as a guide. • Anti-freeze material spraying is carried out around 20 g/m².

Road patrols

Purpose

1. Assess road and road use conditions with the aim of keeping the roadway in good condition at all times
2. Give instructions or take measures when illegal occupancy, abnormal road conditions, or other problems are identified
3. Collect information and documentation needed for roadway management work

On-duty patrol vehicle

Road patrols

Types of road patrols

- **Routine patrols:** Routine patrols typically take place from inside the patrol vehicle. Their purpose is to **visually** check for any abnormalities in road or road use conditions.
  - Average traffic volume of 50,000+ vehicles per day: Once a day
  - Average traffic volume of 5,000–50,000 vehicles per day: Once every two days (Note: in Okinawa)
  - Average traffic volume of less than 5,000 vehicles per day: Once every three days

- **Periodic patrols:** Periodic patrols check the conditions of road facilities **on foot**, and as a general rule are carried out **once a year**

- **Urgent patrols:** Urgent patrols are carried out in cases of severe weather or disasters in order to check for damage to road facilities and determine whether roadways are passible. Measures are carried out as appropriate (examples: **typhoons, heavy downpours, snow, earthquakes with a *shindo* of 4 or higher**).

Road patrols

Rules for patrol personnel

1. Before setting out on patrol, report the patrol area, route, inspection checkpoints, expected return time, and other information to a supervisor. Receive instructions as needed.
2. Start up communications equipment (including mobile phones) when setting out on patrol so that regular communication can be maintained.
3. Wear a safety vest and road patrol armband during patrols so that you are prepared to carry out urgent roadwork if needed.
4. Make sure the PATROL IN PROGRESS sign on the vehicle remains lit while on patrol.
5. Maintain proper contact with your home (or branch) office to issue status reports.
6. If abnormal conditions are discovered, take one of the following actions to prevent traffic risks.
   - Urgent measures
   - Traffic restrictions
   - Any other required measures

Road patrols

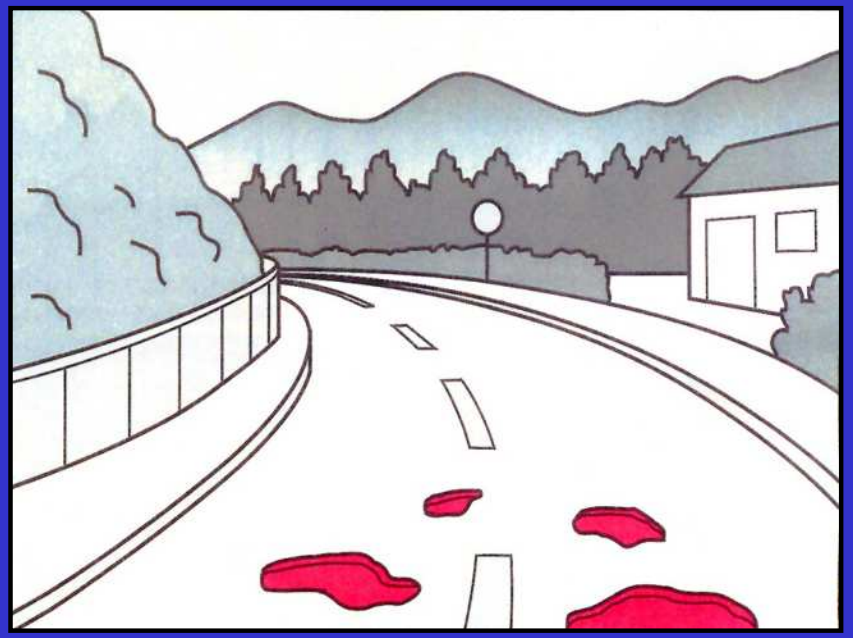
Item checklist

Item	Description
Road management documents	Road management map (1 : 1000 scale)
Recording and measurement	Tape measures, survey poles, survey personnel, cameras (including digital and polaroid cameras) binoculars, spray paint (red and other colors)
Safety equipment	Cones, barricades, safety ropes, safety lighting, signage, fire extinguishers, helmets, batons and/or flags, pruning shears, wire
Lighting	Flashlights
Urgent cleanup items	Bags (to dispose of animal carcasses or garbage)
Tools	Brooms, shovels
Personal items	Personal identification, writing implements, safety shoes, safety vest, road patrol manual
Communications equipment	Mobile phone

Road patrols

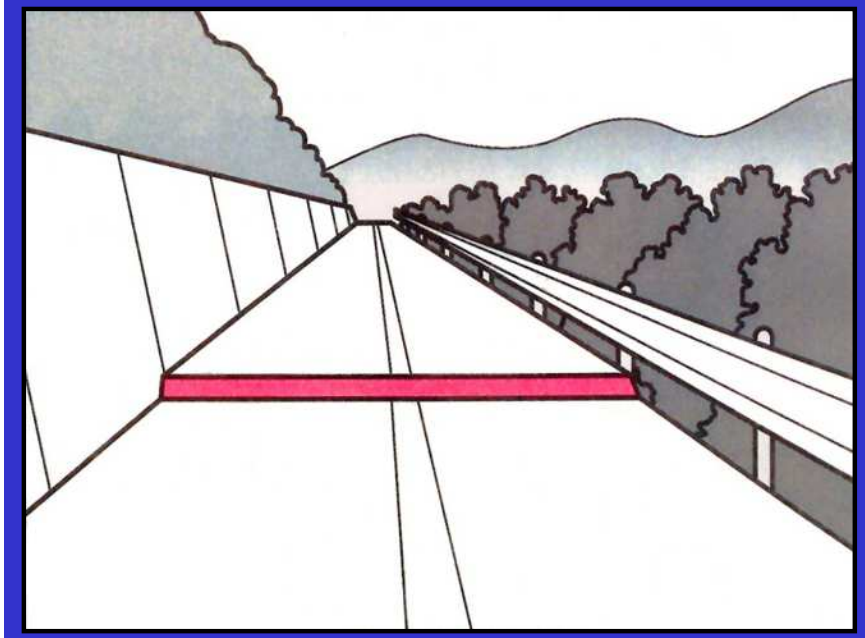
◆ Essential patrol items

Target (focal area)	● Roadways *Potholes and collapsed road surfaces*
What to look out for	Areas that would hinder vehicle, motorcycle, or bicycle travel, particularly larger/deeper holes.
Management concerns	1. Potholes can damage motorcycles and bicycles (e.g. cause a flat) or cause them to fall over, which could result in injury or death 2. Potholes can cause flats or deformed wheels on bicycles



Response

1. Take urgent action to restore quickly using a cold asphalt filler.
2. If urgent repairs are not possible and the pothole poses a risk to motorcycles or other traffic, setup cones, barricades, or other barriers and take steps to fully restore the site as soon as possible. Make sure that any barriers that are set up are safe at night as well.
3. If an occupying business is clearly the cause of the potholes, have the occupying party quickly restore the road and confirm progress at a later date.



Target (focal area)	● Roadways *Uneven surfaces*
What to look out for	Areas around bridges, box tunnels, manholes, catch basins, grate covers, and similar structures
Management concerns	1. Uneven surfaces can damage motorcycles and bicycles (e.g. cause a flat) or cause them to fall over, which could result in injury or death 2. Uneven surfaces can cause flats or deformed wheels on bicycles 3. Uneven surfaces cause increased noise and vibration, often triggering complaints

Response

1. Take urgent action to restore quickly using a cold asphalt filler.
2. Confirm the cause of the uneven surface and continue to investigate (note: it may be a result of third-party work)
3. Restore the roadway before the unevenness becomes severe.

Maintenance and management initiatives #1: Reducing mowing area

■ Reducing mowing area (partial mowing)

After checking growth along slopes, median strips, and the like, administrators remove weeds to ensure visibility for vehicles using the road.

■ Sidewalk area along National Highway 1 (Totsuka-ku, Yokohama)

Entire area mowed (before)

Partially mowed (current)

Maintenance and management initiatives #2: Examples from Okinawa

- Overview
  - Partial mowing in medians on wide roads
  - Reducing mowed area cuts vegetation removal costs
  - Costs were successfully reduced , but there were complaints that the measures compromised the scenery

Before

Typical full-area mowing

After

Partial area mowing on wide median

Maintenance and management initiatives #3: Examples from Okinawa

- Overview
  - Every installed light had been turned on in the past, but a test was conducted to turn them off in areas where it was thought that doing so would not cause traffic accidents
  - The measure successfully cut electricity costs
  - Lights were left off except in those areas where we received resident complaints

Before

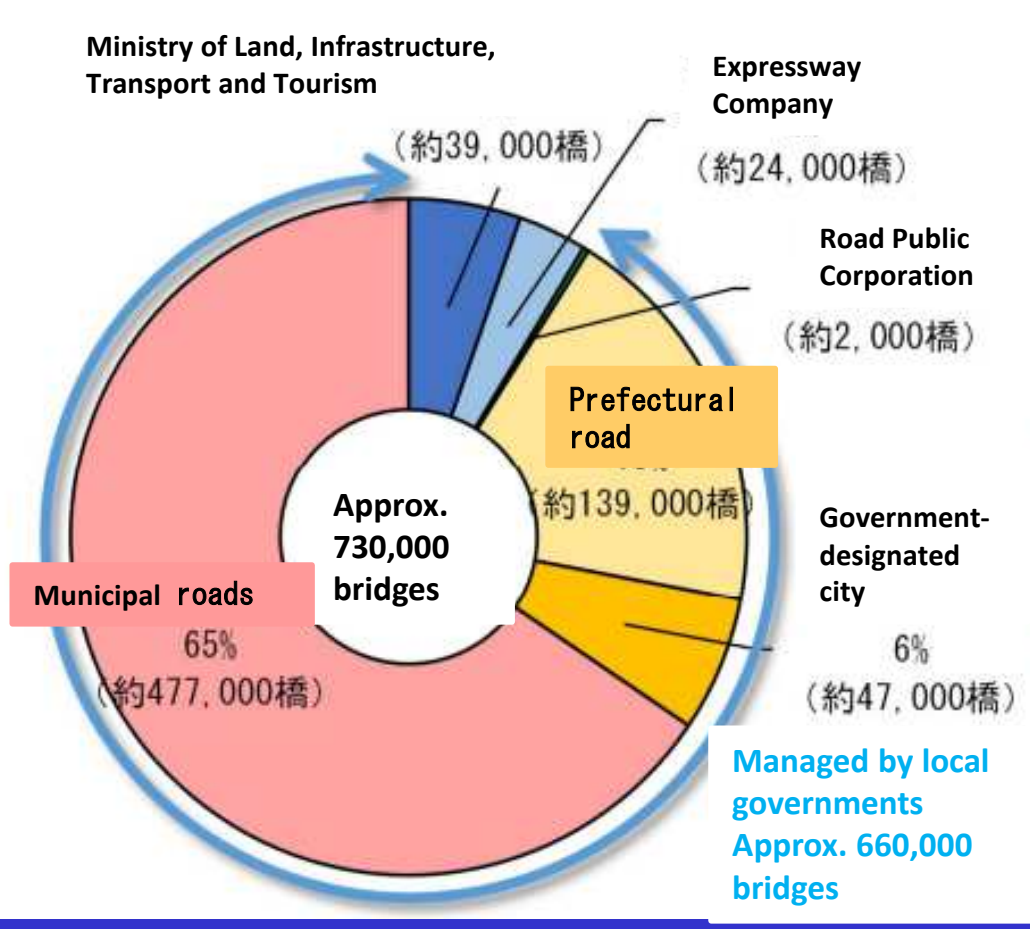
After

3. Road structures and equipment

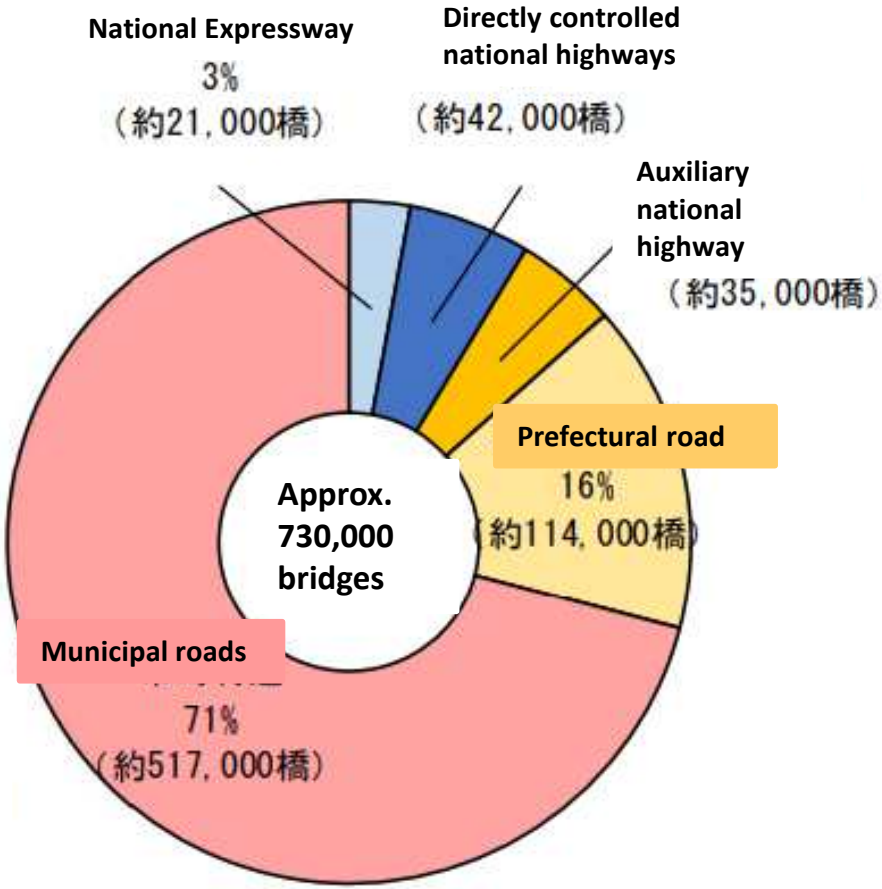
Status of roadway structures (bridges)

○ There are approximately 730,000 bridges in Japan, of which approximately 660,000, or more than 90%, are managed by local governments.

○ Number of bridges by road administrator



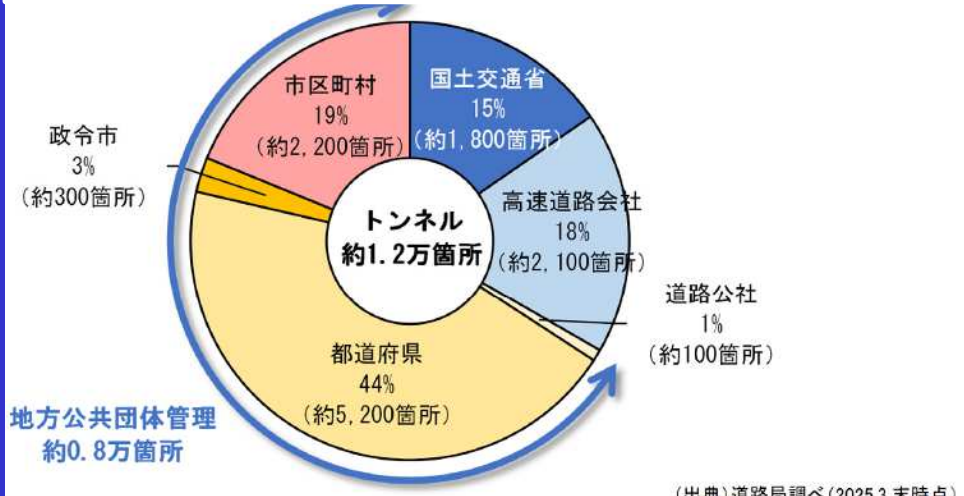
○ Number of bridges by road type



Status of roadway structures (tunnels)

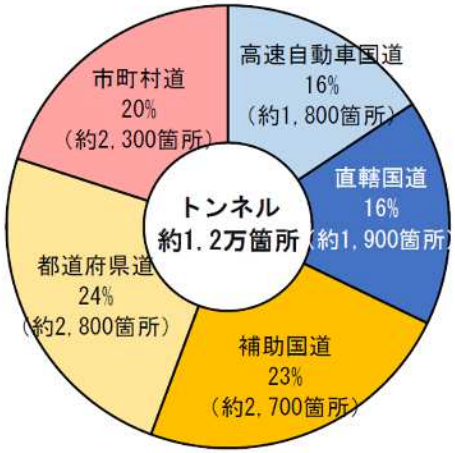
○ There are approximately 12,000 tunnels in Japan, of which approximately 8,000 are managed by local governments, accounting for more than 70%.

○ By road administrator



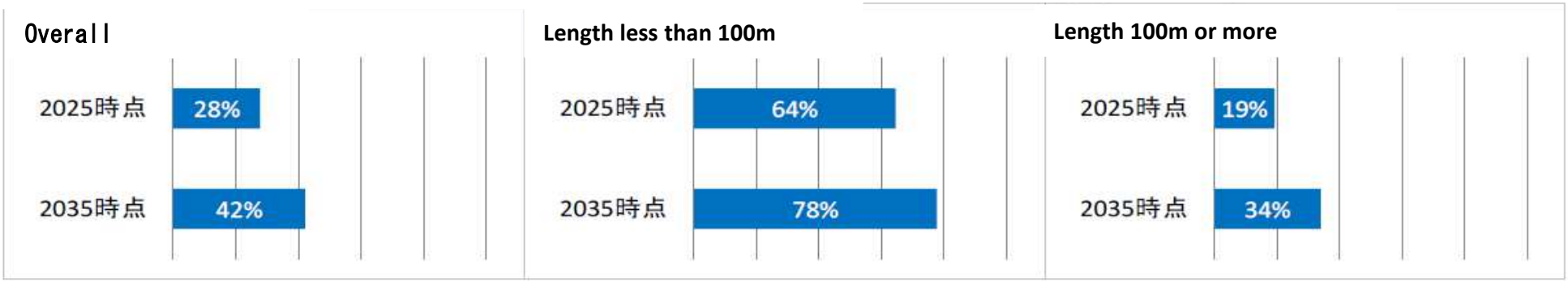
（出典）道路局調べ（2025.3 末時点）

○ Road type



（出典）道路局調べ（2025.3 末時点）

○ Percentage of tunnels that are more than 50 years old



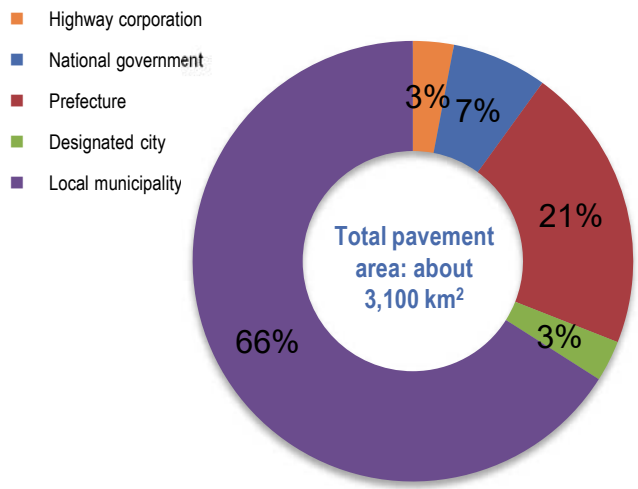
※この他、古いトンネルなど記録が確認できない建設年度不明トンネルが約 240 箇所ある。

（出典）道路局調べ（2025.3 末時点）

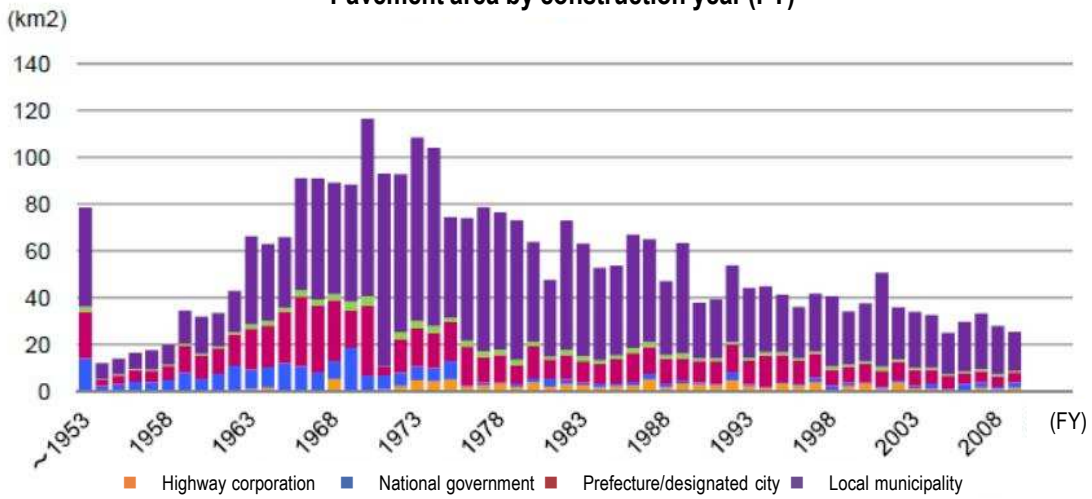
Status of roadway structures (pavement)

- Detailed investigations still underway
- Prefecture/designated city figures include local public highway corporations

Pavement area by administrator

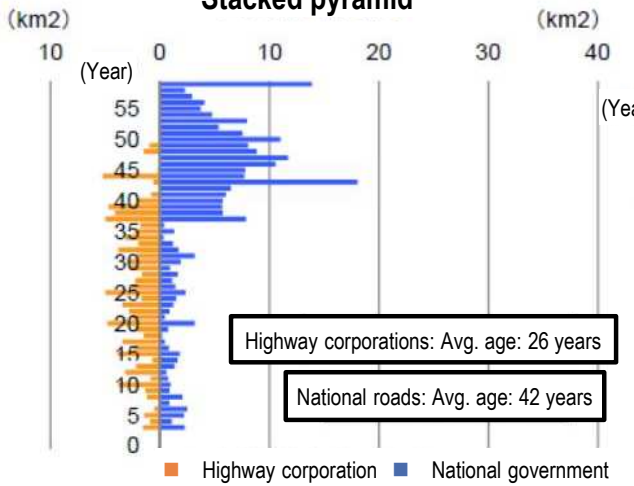


Pavement area by construction year (FY)

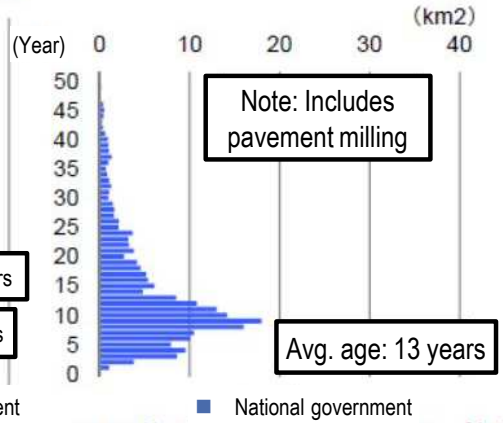


Note: Does not include 2011–2012 data

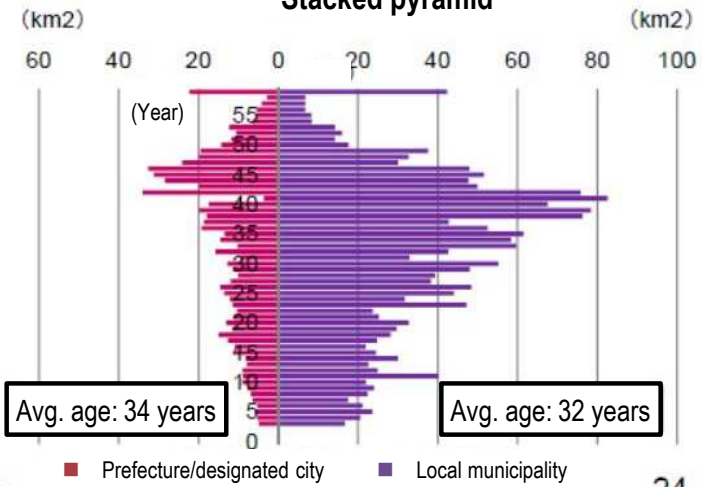
Stacked pyramid



Stacked pyramid (reference)



Stacked pyramid



Note: Exact construction year is not known for about 20 km² of pavement

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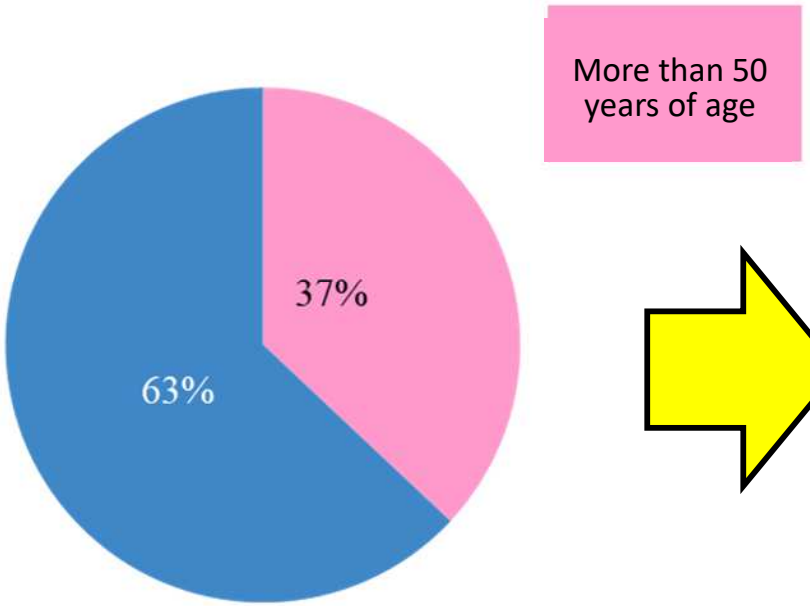
Source: Documents from the Fifth Investigative committee on maintenance and management of national roads (national road management), MLIT website

Current status of bridges in Japan

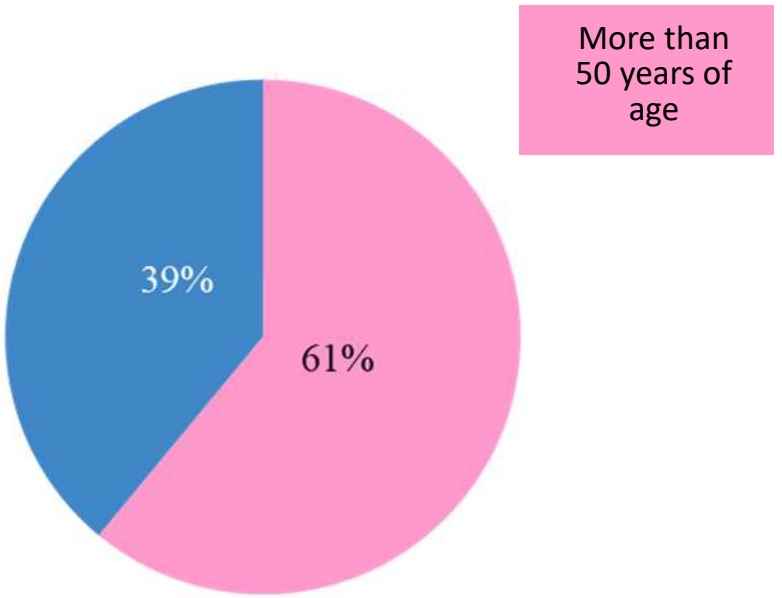
○ The proportion of bridges built 50 years ago will increase sharply to about 61% in 10 years.

Change in construction age (bridges)

As of 2023



As of 2033（after10 years）



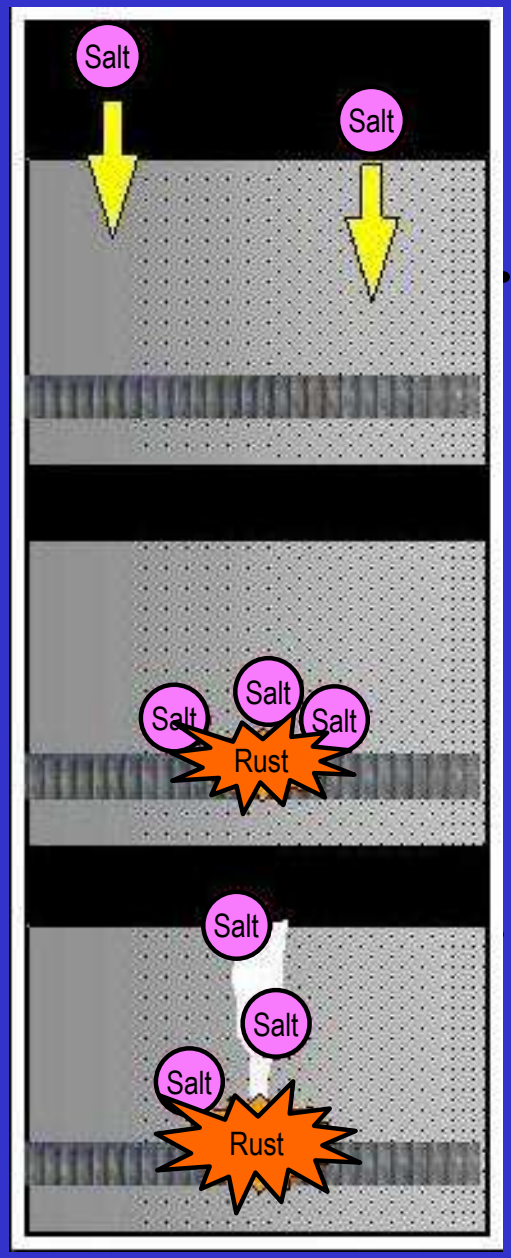
Bridges: Salt damage

Snapped steel wires in an aging prestressed concrete bridge

Salt damage

- Salt damage process and countermeasures

Aging process



Surface coating

Cathodic protection

Cost of countermeasures

Bridges: Alkali-aggregate reaction in concrete

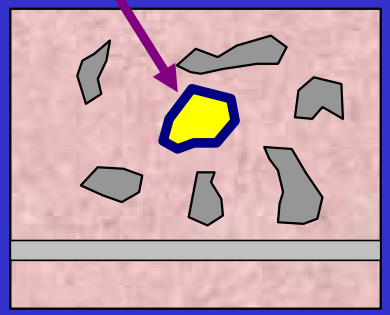
Tortoiseshell cracks appear

Alkali-aggregate reaction in concrete

- Alkali-aggregate reaction and countermeasures

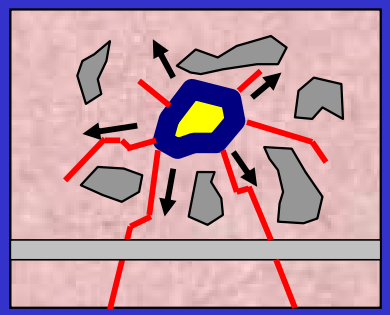
Aging process

Reactive aggregate

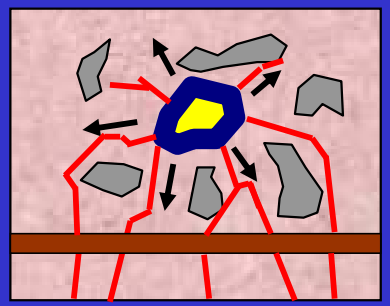


Expansion due to ASR*

**Alkali silica reactivity*



Cracking



Cracking increases, rusty fluid from corrosion of steel materials

Cost of countermeasures

Crack filling method

Steel plate bonding method

Bridges: Chipping concrete slabs (nationwide)

Fallen concrete chip caused an accident

Danger from chips weighing 300 grams or more

Falling of concrete slabs

- Deterioration due to aging and countermeasures

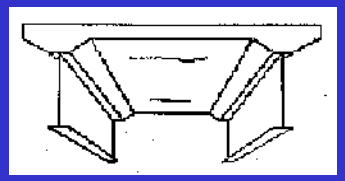
Aging process

Cost of countermeasures

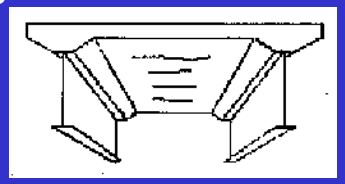
Low

High

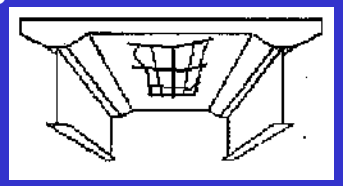
Stage 1



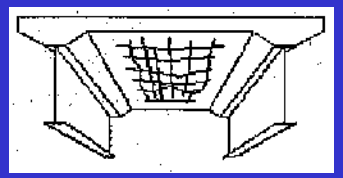
Stage 2



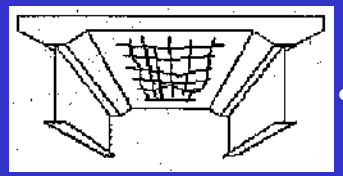
Stage 3



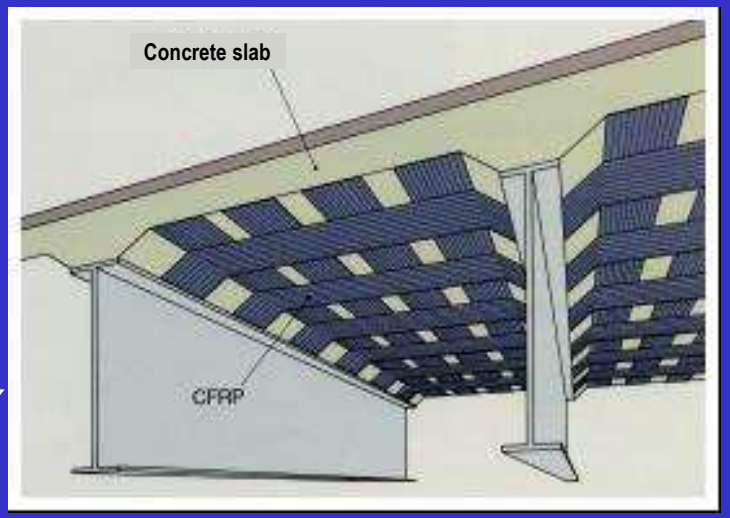
Stage 4



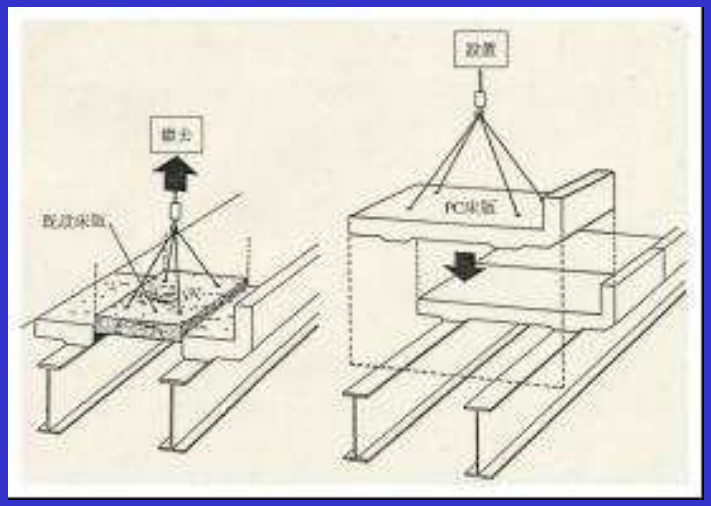
Stage 5



Concrete slab



Reinforcement with carbon fiber sheets

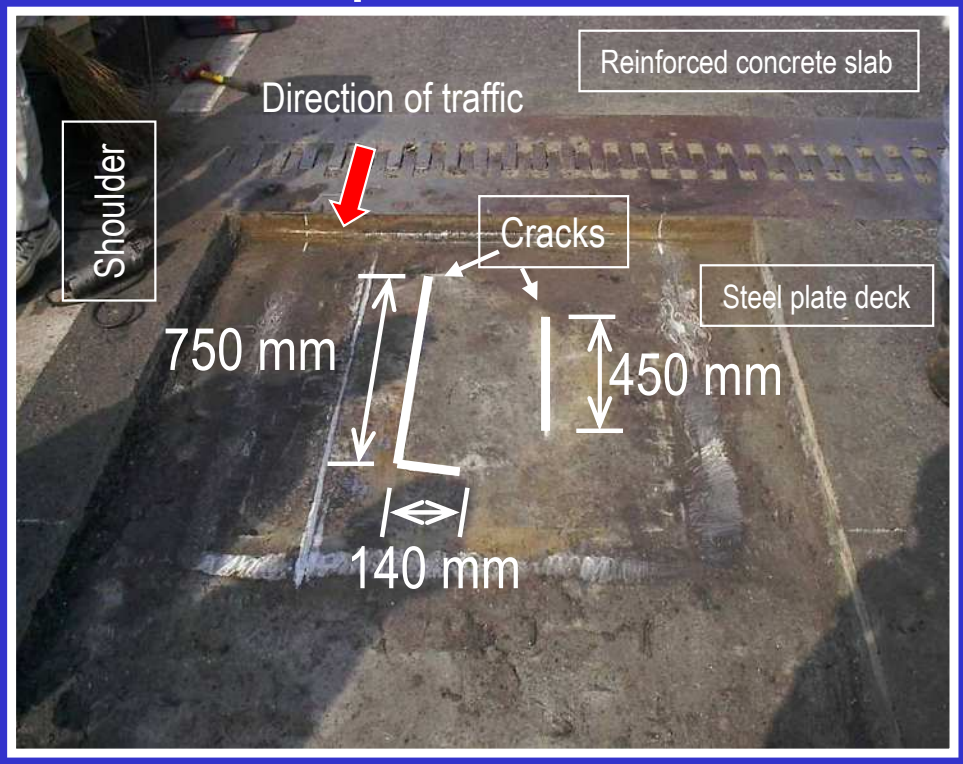


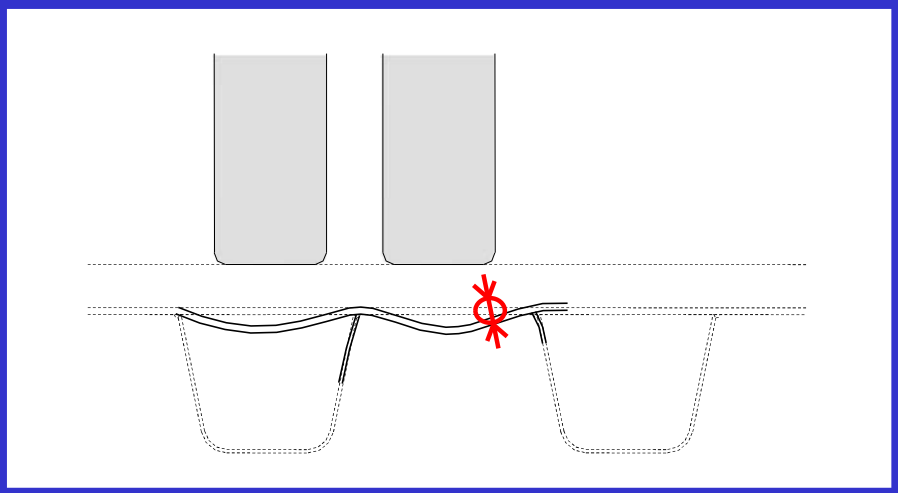
Replacement

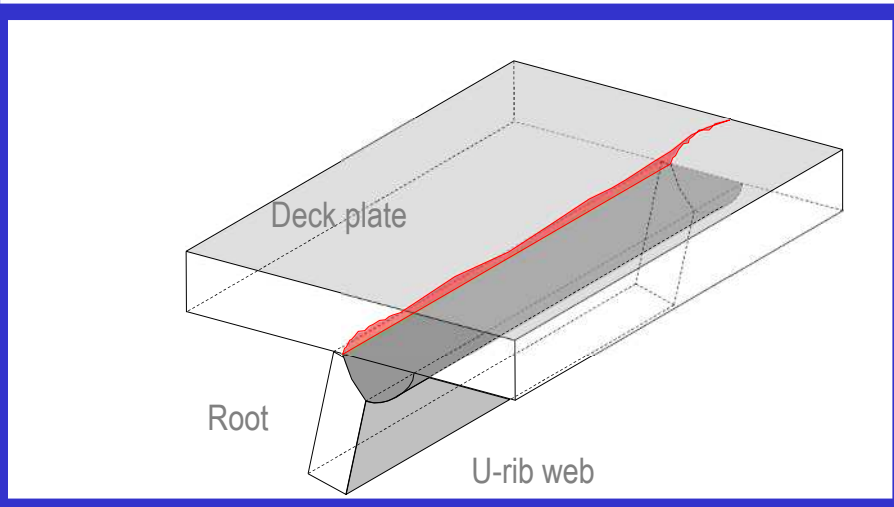
Bridges: Fatigue cracks in steel plate decks (nationwide)

Changes in pavement

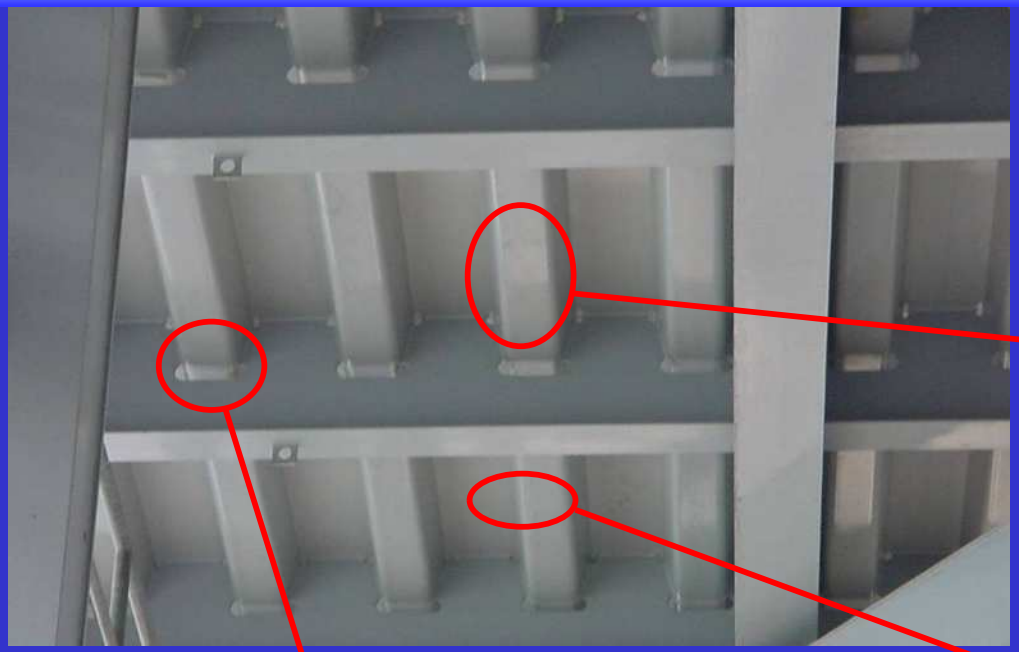
Partial pavement removal



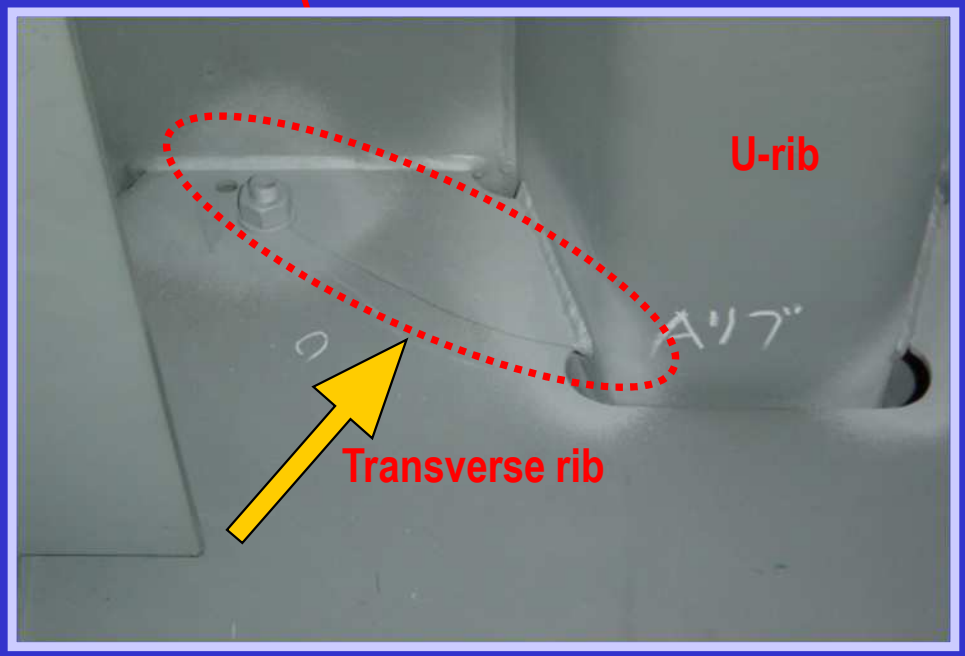




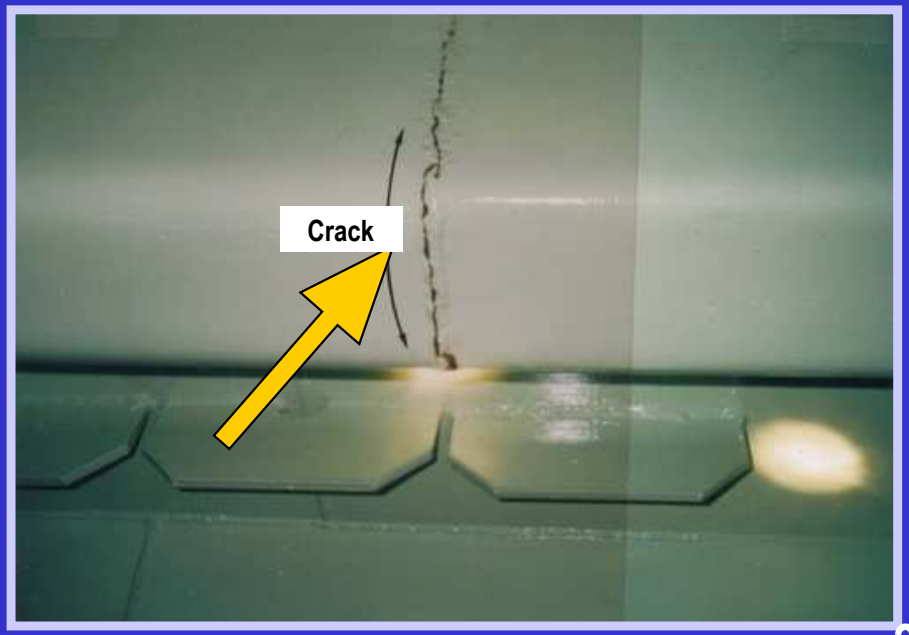
Bridges: Fatigue cracks in steel plate decks (nationwide)



Steel plate deck: Longitudinal rib and deck plate joint



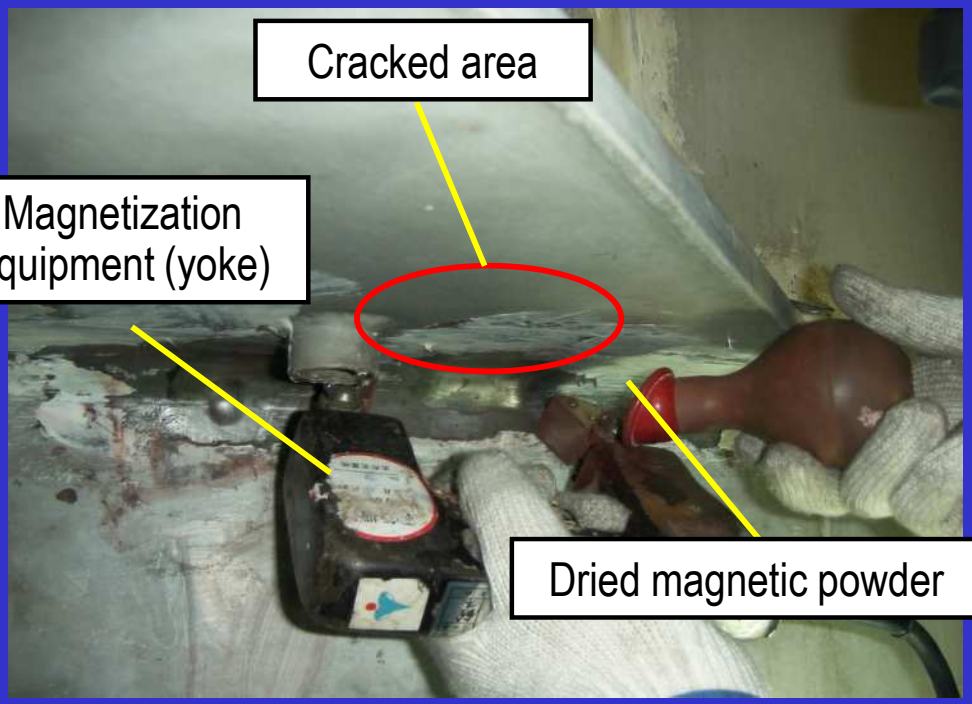
Steel plate deck: Intersection of transverse and longitudinal rib



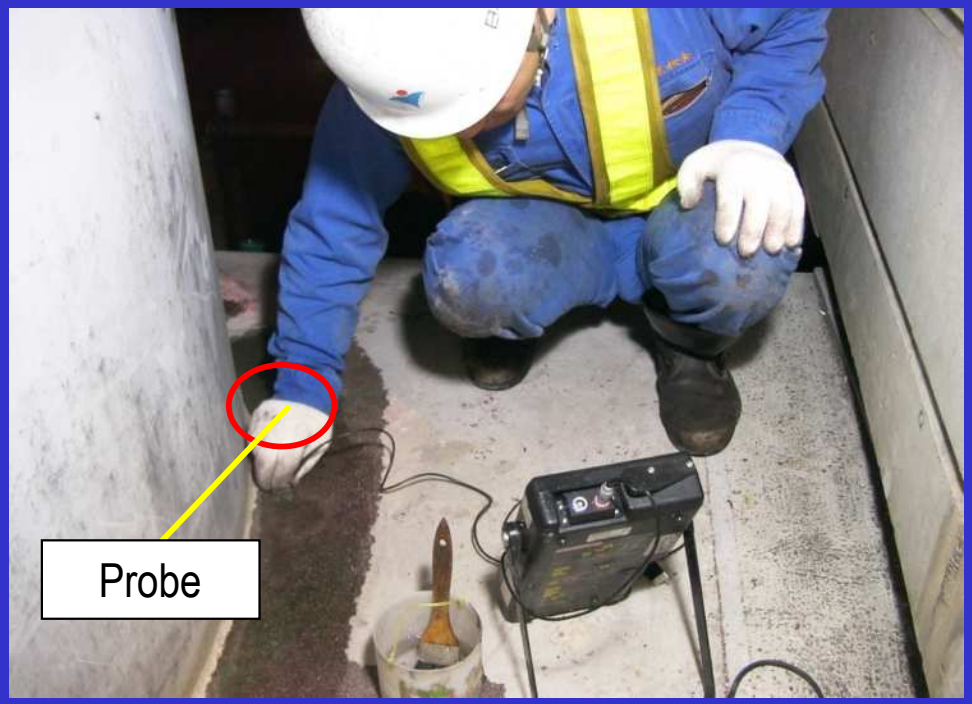
Steel plate deck: Longitudinal rib weld area

Bridge cracking surveys (nationwide)

Inspecting fatigue cracks in steel bridge piers (minute cracking)



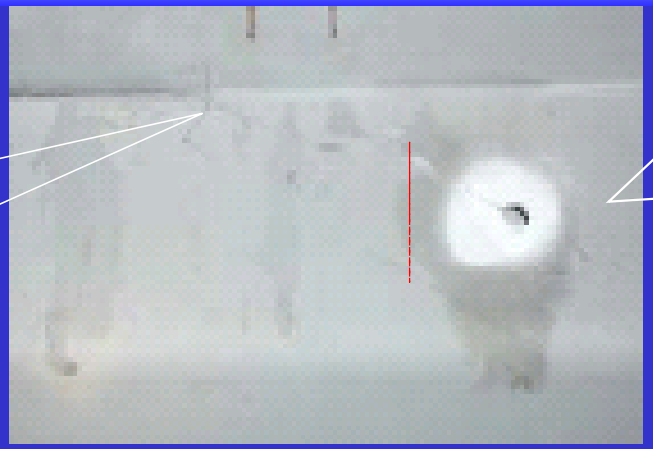
Magnetic particle inspection



Ultrasonic inspection

Bridges: Steel fatigue and countermeasures (nationwide)

Cracks and stop holes in steel plate deck U-ribs



Urgent countermeasure for stop hole (stop cracks from spreading)

Cracked areas

Repairs secured with bolts
On-site welding prohibited

Repaired with splice plates

Corners strengthened with reinforcing materials

Source: Highway Technology Research Center

Severe damage to bridges during past earthquakes (piers)

Example #1
Severe damage to a reinforced concrete single pillar pier conforming to standards prior to those in the 1980 *Specifications for Highway Bridges* (Great Hanshin Earthquake)

Example #2
Severe damage to a steel single pillar pier conforming to standards prior to those in the 1980 *Specifications for Highway Bridges* (Great Hanshin Earthquake)

Example #3
Severe damage to non–reinforced concrete single pillar piers (wall-type piers, fixed piers for continuous girders in rigid-frame bridges) conforming to standards prior to those in the 1980 *Specifications for Highway Bridges* (Great Hanshin Earthquake)

All examples of major damage were to fixed piers in continuous bridges

Severe damage to bridges during past earthquakes (upper portion)

Example #4
Severe damage to a simple girder bridge without abutments on either side and a cantilever girder bridge

Collapse of elevated simple girder bridge
(Great Hanshin Earthquake)

Collapse of cantilever girder bridge
(2005 Miyagi Earthquake)

Example #5
Severe damage due to the impact of fluidization and similar factors, severe damage to skew and curved bridges

Collapse due to liquefaction/fluidization
(Niigata Earthquake)

Warped pier foundation due to fluidization
(Great Hanshin Earthquake)

Collapse of skew bridge
(Great Hanshin Earthquake)

Collapse of curved bridge
(Great Hanshin Earthquake)

Potholes in pavement/road surface (nationwide)

Older roadside trees blown over in typhoons (nationwide)

Metal corrosion on pedestrian bridge handrails (nationwide)

Accident due to corrosion of metal fittings on pedestrian bridge handrail

Inspections of roadway fixtures (lighting/signs) (nationwide)

Fallen sign

Corrosion of essential lighting components (nationwide)

Other countermeasures based on past accidents

1) Securing steel lids to catch basins at four points (accident occurred when a large vehicle ran over the lid and caused it to pop up)

2) Measures to prevent steel lids on sidewalk catch basins from floating up (accident occurred when a child was sucked into the basin)

3) Countermeasures to close guardrail gaps (caused an accident on a highway tour bus)

Approach to future repairs

America in Ruins

- "America in Ruins" was the title of a paper describing the state of US infrastructure during the 1970s and 80s, when numerous bridges collapsed or were closed to traffic. The country began taking preventative safety measures as a result of the lessons learned during this period.

Sudden collapse of the I-35 West Mississippi River Bridge in Minneapolis (opened in 1967)

On the morning of August 1, 2007 around 6 PM local time (about 8 AM the following morning in Japan), the interstate (I-35 West) bridge spanning the Mississippi River in Minneapolis, Minnesota suddenly collapsed. The bridge had opened for service in 1967.

- The disaster occurred during rush hour, and collapsing bridge took with it 20 or 30 vehicles. Thirteen people died.

Prior to the collapse

Source: Website of John Weeks

After the collapse

Source: CNN official website

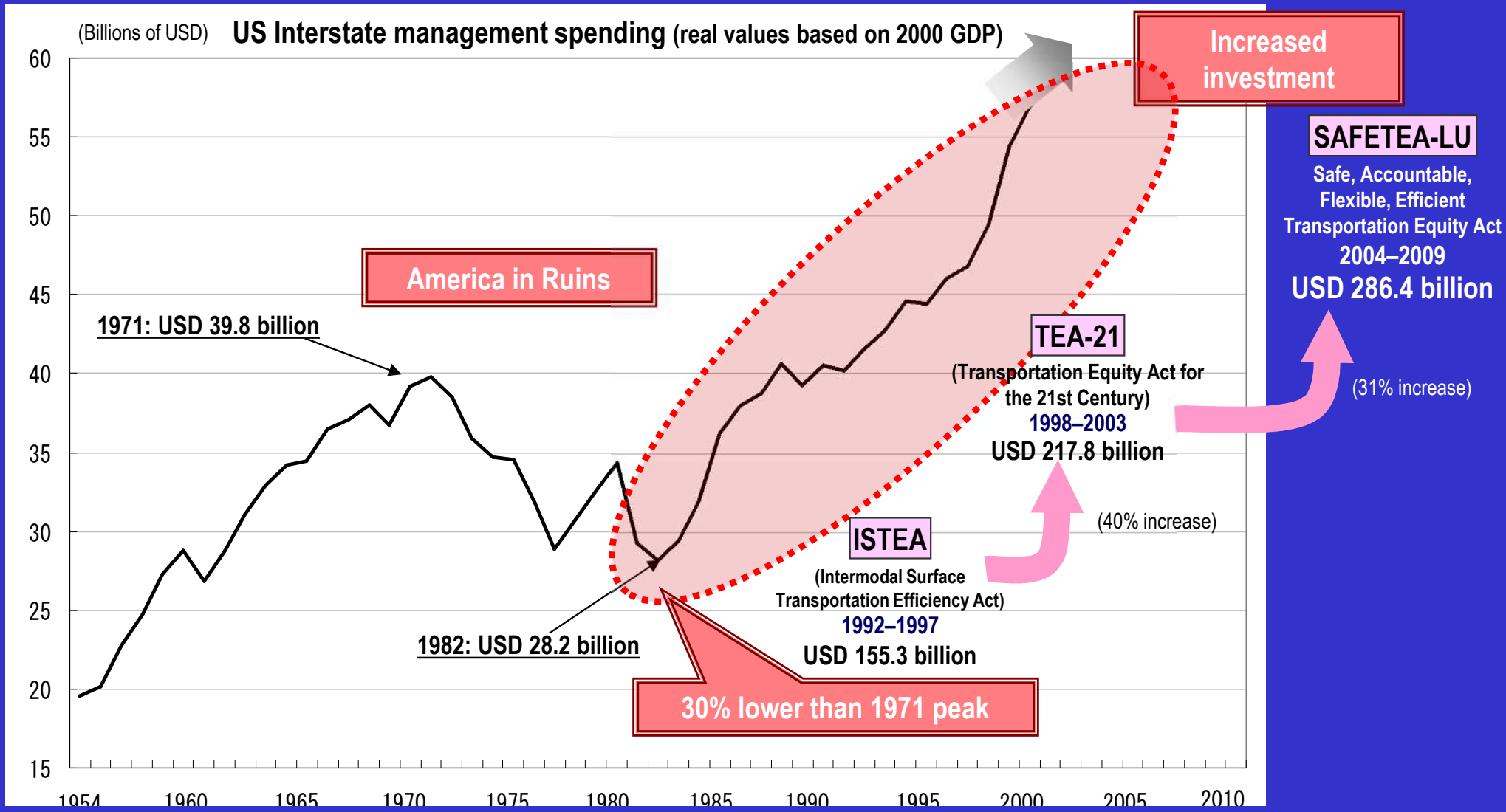
Bridge facts

- Started service in 1967 (40 years old at the time of the collapse)
- Span: 581 m (1,907 ft)
- Daily traffic volume: about 140,000 vehicles

(Source: News reports)

US highway investment

- The US cut highway investment by 30% in the ten years leading up to 1983, and then substantially increased it.
- The added funding did not go to new construction, but instead towards enhancing existing networks—initiatives that led to upgrades and quality improvements.

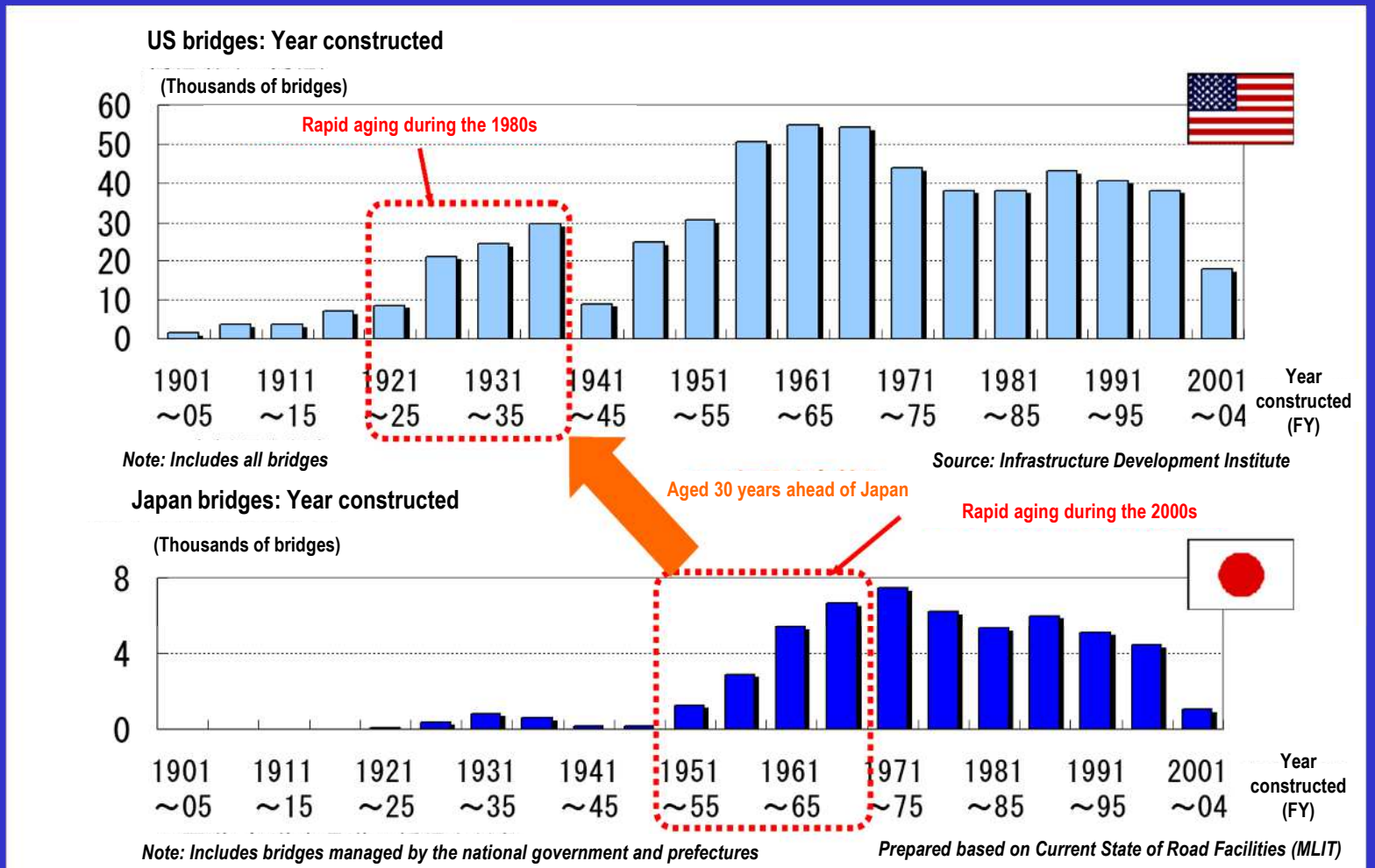


Source: Highway Statistics and others

Approach to future repairs

Rapid aging of Japan's bridges

- America's roadway facilities began to age rapidly during the 1980s, 30 years before Japan
- Today, Japan's infrastructure is aging at a brisk pace



Necessity of a longevity and repair plan

(1) Regular inspections (health checks) and repairs (early treatment)

As with human heath, it is important to collect data in the form of critical statistics, inspections, repair histories, and so on. Preventative maintenance is then carried out systematically on the basis of scientific information in order to maintain the soundness of roadway facilities while extending their service life.

Human health

Regular checkups

Prepare medical charts (physical data, health checkup results, treatment history)

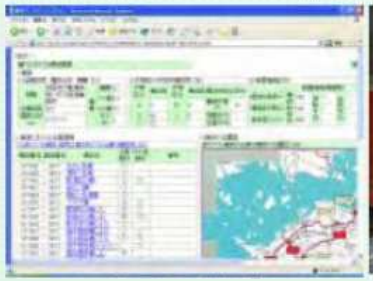
Early treatment

Both people and bridges require ongoing checkups and preventative measures

Analogous

Bridge health

Regular inspections



Prepare charts (critical statistics, inspection results, repair history)

Preventative maintenance

Source: Documents from the Council for Social Infrastructure, Road Subcommittee website (MLIT)

Necessity of a longevity and repair plan

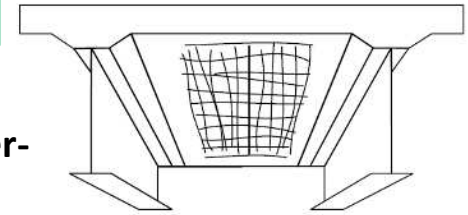
(2) Shift to preventative bridge maintenance

Early detection and early repair makes it possible to ensure facility safety, extend service life, and reduce lifecycle costs.

Corrective maintenance

Conver-sion

Serious cracks in the concrete

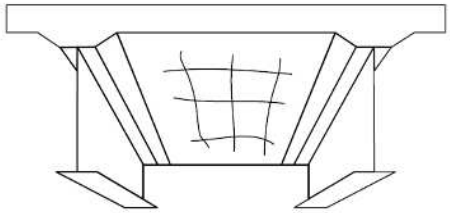


Concrete repair

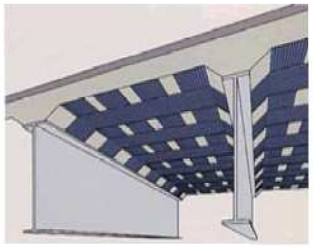
Large-scale repairs are only carried out once damage becomes serious, and the bridge replacement cycle is short.

Preventive maintenance

Inspection revealed minor cracks in the concrete

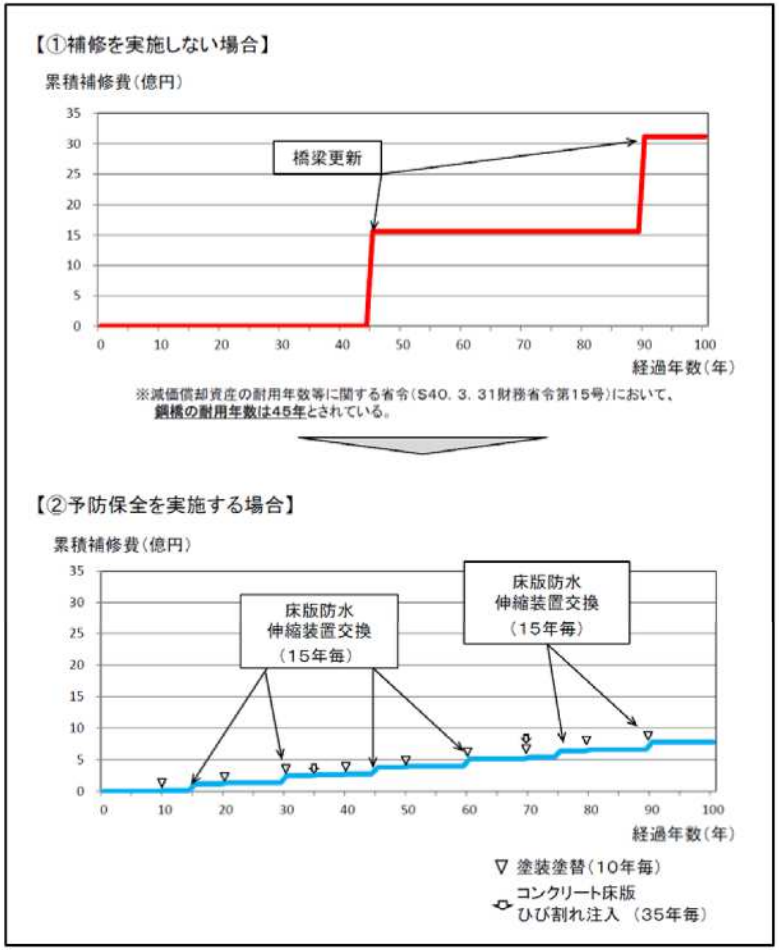


Carbon fiber is bonded to the underside to prevent cracks from progressing.



By inspecting bridges properly and carrying out repairs before damage becomes serious, the bridge replacement cycle can be extended.

【Effects of preventive maintenance (image)】



Longevity and repair plan overview

All bridges on national roads are inspected every five years. When damages are discovered, material reinforcements or other measures are taken to ensure load-bearing strength. Systematic repairs and replacements are carried out on all bridges based on the results of these inspections.

Inspections and repairs

Up-close visual inspection

(once every five years)

Key inspection items

- Corrosion or cracks in steel materials
- Cracked concrete
- Scour at the foundation and more

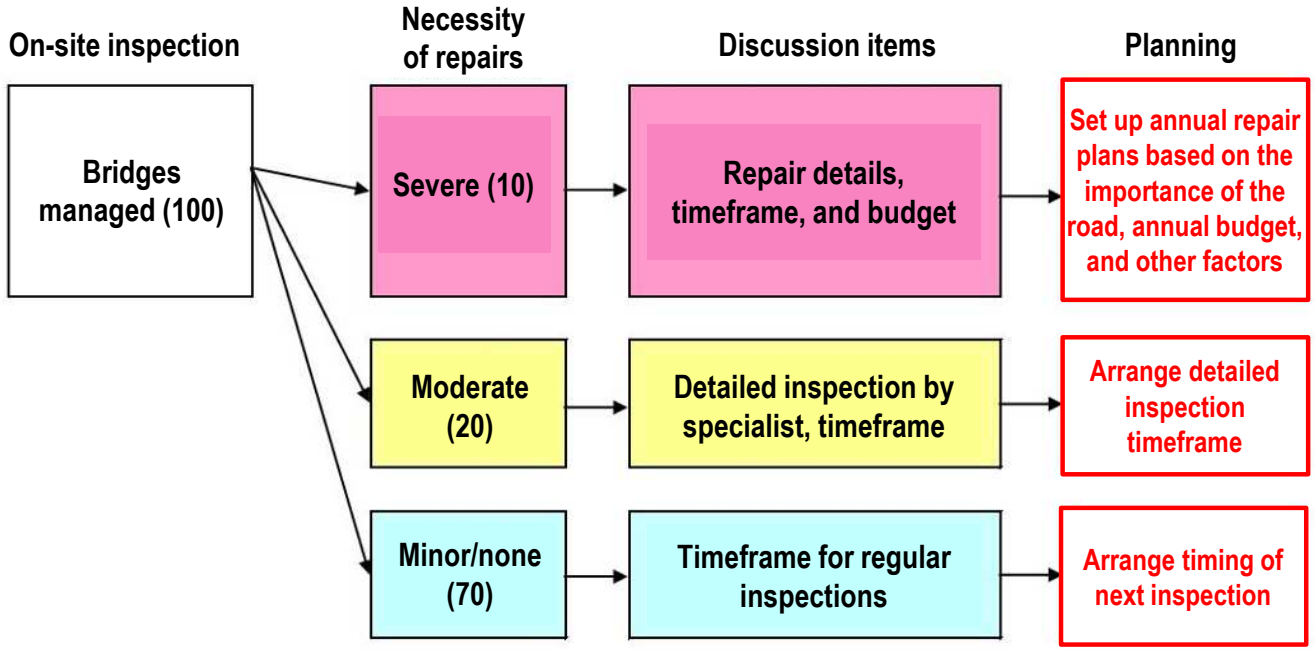
Identify damage conditions

Reinforcements to ensure load-bearing strength

- Corroded steel→install steel plates (cover plates)
- Cracked concrete→Attach steel plates

Determining the necessity of repairs and other improvements

- **Severe**: Discuss repair details, timeframe, and budget
- **Moderate**: Order a detailed inspection by a specialist and discuss timeframe
- **Minor/none**: Discuss timeframe for regular inspections



4. Disaster management

Potential natural disasters

- The area that the Okinawa General Bureau overseas is subject to earthquakes, wind and water damage, and other natural disasters
- Measures to protect against seismic activity are particularly important in earthquake-prone Japan. Wind and rain damage are most common in Okinawa, which is frequently hit by typhoons.

Earthquakes

Tsunami

Typhoons

Earthquake response (urgent inspections)

- Urgent inspections are carried out whenever an earthquake with a *shindo* of 4 or greater strikes
- The goal is to check damages to road surfaces, structures, and so on within two hours.

Patrol car inspections

Checking damages

Earthquake response (urgent restoration)

- Areas where damage is confirmed are urgently restored, and traffic flow is resumed

Earthquake damage

Damage: Road uplift

After urgent restoration

Earthquake damage

Damage: Uneven pavement

After urgent restoration

The Great Tohoku Earthquake (March 11, 2011)

■ The Great Tohoku Earthquake was the fourth largest since 1900 and the largest ever recorded in Japan (in terms of magnitude)

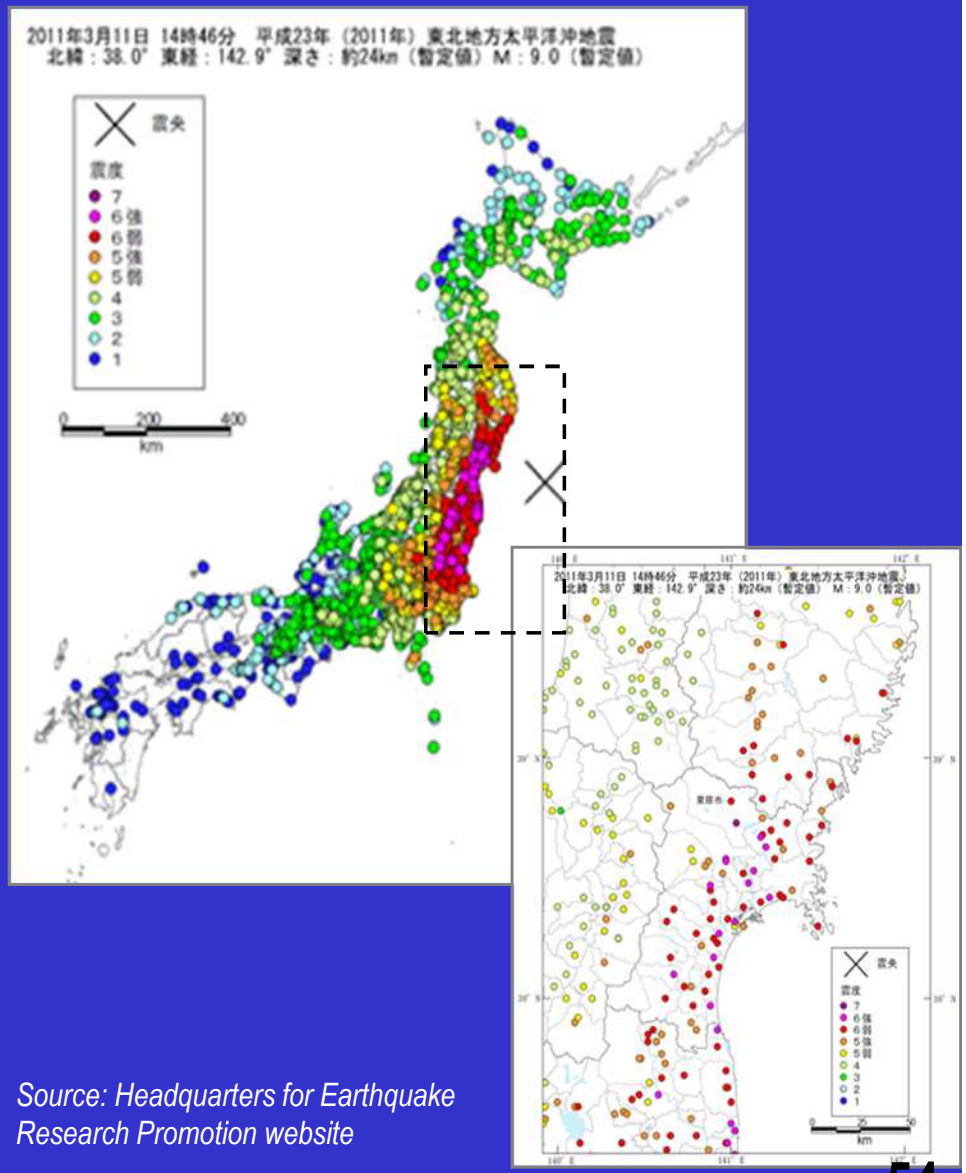
● Largest earthquakes in the world since 1900

Location	Date	Magnitude	Details
Chile	May 1960	9.5	5,700 killed
Alaska	March 1964	9.2	135 killed
Sumatra	December 2004	9.1	More than 200,000 killed or missing
Tohoku Pacific Coast	March 2011	9.0	More than 22,000 killed or missing

● Largest earthquakes in Japan since 1900

Location	Date	Magnitude	Details
Tohoku Pacific Coast	March 2011	9.0	More than 22,000 killed or missing
Sanriku	March 1993	8.4	3,064 dead or missing, 1,817 homes destroyed, 4,034 homes swept away
Tokachi-Oki	September 2003	8.3	2 dead or missing 250 homes destroyed
Tonankai Tokachi-Oki	December 1944 March 1952	8.1	1,223 dead or missing, 17,599 homes destroyed, 3,129 homes swept away 33 dead or missing, 815 homes destroyed, 91 homes swept away
Kanto	September 1923	7.9	142,000+ dead or missing, 254,000+ homes destroyed, 447,000+ homes swept away
Niigata	June 1964	7.5	26 dead or missing, 1,960 homes destroyed, 15,298 homes swept away
Southern Hyogo	December 1995	6.9	6,435 dead or missing, 104,906 homes destroyed, 7,483 homes swept away

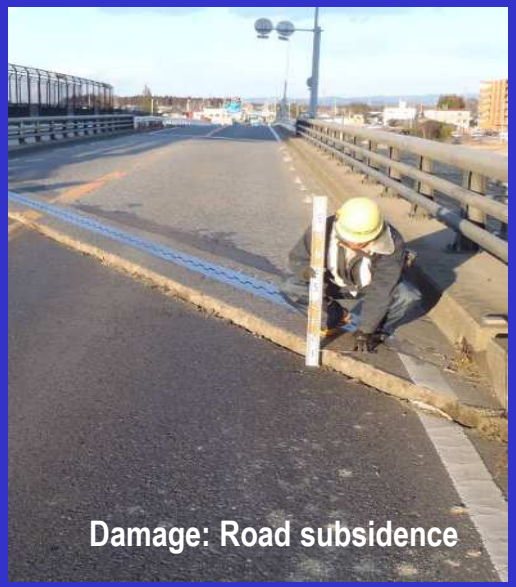
● Great Tohoku Earthquake: Map of shindo readings



Source: Headquarters for Earthquake Research Promotion website

Damage from the Great Tohoku Earthquake (Kanto region)

National Route 4: Nasu, Tochigi Prefecture



National Route 4:
Nasushiobara, Tochigi Prefecture

National Route 4: Nasushiobara, Tochigi Prefecture

National Route 4:
Nasu, Tochigi Prefecture

Damage from the Great Tohoku Earthquake (Kanto region)

National Route 6: Sakado-cho, Mito City, Ibaraki Prefecture

National Route 6: Isohara-cho, Kitaibaraki City, Ibaraki Prefecture

National Route 6: Isohara-cho, Kitaibaraki City, Ibaraki Prefecture

National Route 50: Chikusei, Ibaraki Prefecture

Damage from the Great Tohoku Earthquake (Kanto region)

National Route 51:
Inashiki, Ibaraki Prefecture

National Route 51:
Oarai-cho, Higashi-Ibaraki-gun, Ibaraki Prefecture

National Route 51:
Nishishiro, Inashiki City, Ibraki Prefecture

National Route 51:
Tsunoore, Kashima City,
Ibaraki Prefecture

National Route 51:
Oarai-cho, Higashi-Ibaraki-gun,
Ibaraki Prefecture

Damage from the Great Tohoku Earthquake (Kanto region)

National Route 51:
Inashiki, Ibaraki Prefecture

National Route 51: Nishishiro, Inashiki, Ibaraki Prefecture

National Route 357: Kawasaki-ku, Kawasaki

National Route 357: Kawasaki-ku, Kawasaki

Damage from the Great Tohoku Earthquake (Kanto region)

National Route 357: Yokohama Bay Bridge

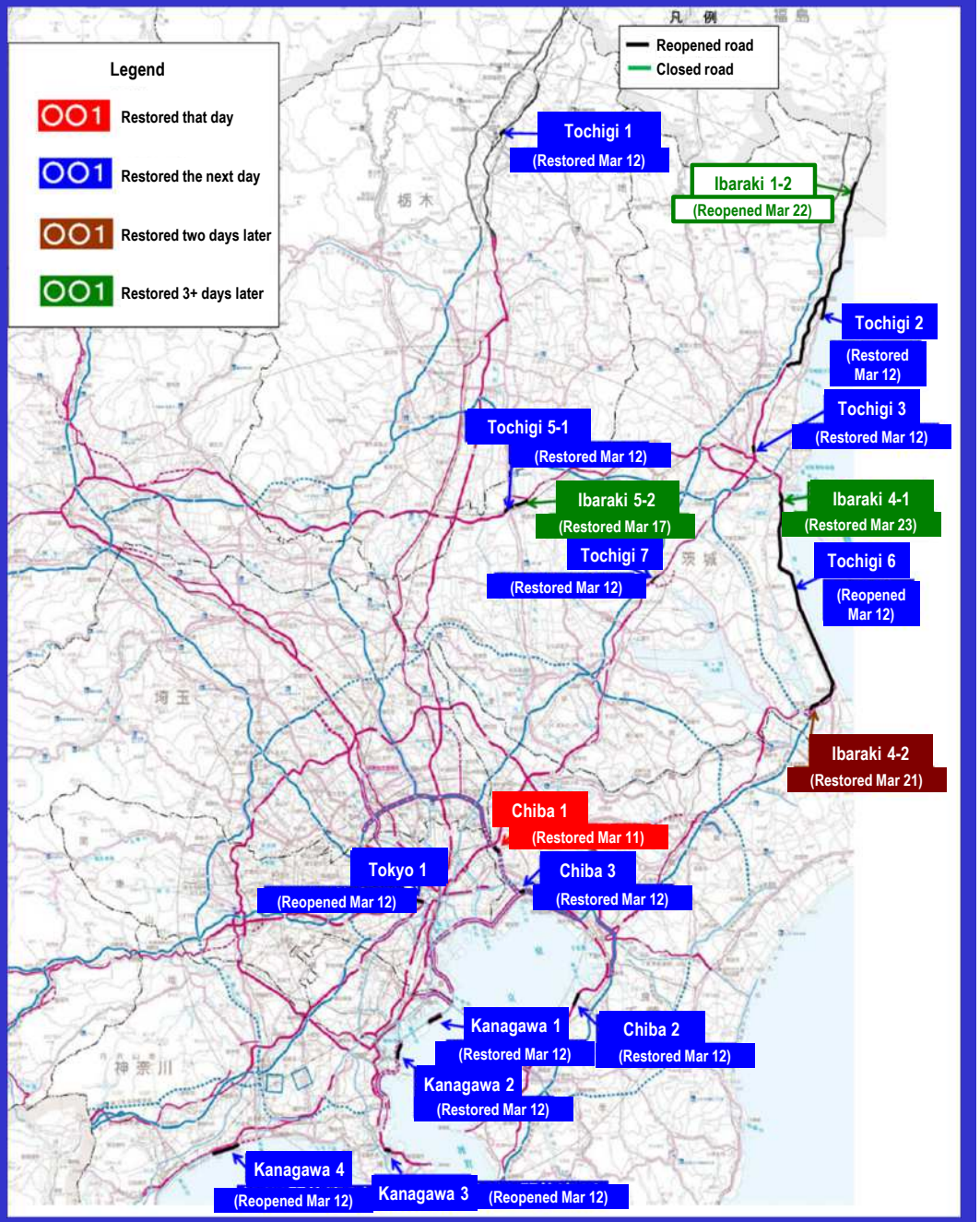
National Route 4: Kinugawa Bridge

National Route 51: Higashiko Bridge

Urgent restoration of areas damaged in the Great Tohoku Earthquake (Kanto region)

■ Urgent restoration was completed for most of the damaged areas within two days of the disaster, and traffic restrictions were lifted

Map code	Road	Area	Damage	Notes
Tochigi 1	NR 4	Nasushiobara City, Tochigi Pref.	Uneven road (on bridge)	Road reopened Mar 11 16:35–Mar 12 17:12
Ibaraki 1	NR 6	Tokai Village–Kitaibaraki City (Hitachi Shuchojo district), Ibaraki Pref.	Tsunami risk	"Road Closed" display→removed Mar 11 15:30–Mar 13 07:00
Ibaraki 2	NR 6 (Hitachi BP)	Hitachi-Asahi bridge	Uneven road	Road reopened Mar 11 15:55–Mar 12 16:00
Ibaraki 3	NR 6	Mitoshi City, Ibaraki Pref.	Road uplift	Road reopened Mar 11 17:35–Mar 12 17:30
Ibaraki 4-1	NR 51	Narita, Oarai-machi, Ibaraki Pref.	Uneven road	Road reopened Mar 12 04:50–Mar 23 06:00
Ibaraki 4-2	NR 51	Kashima City (Shinjingu Bridge), Ibaraki Pref.	Uneven road	Road reopened Mar 11 15:30–Mar 13 14:30
Ibaraki 5-1	NR 50	Chikusei City (Shimodate Overpass), Ibaraki Pref.	Uneven road	Shimodate Overpass/ road reopened Mar 11 15:40–Mar 12 17:30
Ibaraki 5-2	NR 50	Chikusei City (Shinfujimi Bridge), Ibaraki Pref.	Uneven road	Shinfujimi Bridge/road reopened Mar 11 15:40–Mar 17 05:30
Ibaraki 6	NR 51	Hakota City, Ibaraki Pref.	Tsunami risk	"Road Closed" display→removed Mar 11 15:30–Mar 12 08:00
Ibaraki 7	NR 6	Ishioka City, Ibaraki Pref.	Uneven road (on bridge)	Road reopened Mar 11 15:30–Mar 12 18:05
Tokyo 1	NR 20	Shinjuku (Shinjuku Gyoen Tunnel), Tokyo	Traffic conjestion	Road reopened Mar 11 20:40– Mar 12 02:15 (inbound) Mar 12 04:18 (outbound)
Chiba 1	NR 298 (Tokyo Gaikan/Main route)	Matsudo City, Chiba Pref.	Misaligned girder on temporary bridge	Road reopened Mar 11 15:40–18:50
Chiba 2	NR 16	Ichihara City, Chiba Pref.	Fire alongside road (oil refinery fire)	Road reopened Mar 11 17:30–Mar 12 13:00
Chiba 3	NR 357 (Urayasu IC/Ramp C)	Urayasu City, Chiba Pref.	Uneven road	Road reopened Mar 11 21:05–Mar 12 23:45
Kanagawa 1	NR 357	Kawasaki City (Higashiogi-shima), Kanagawa Pref.	Liquification	Road reopened Mar 11 17:33–Mar 12 12:55 Mar 12 08:00 (inbound lanes opened to two-way traffic, outbound lanes closed) Mar 12 12:55 (all lanes reopened)
Kanagawa 2	NR 357	Yokohama (Yokohama Bay Bridge), Kanagawa Pref.	Damaged joint	Road reopened Mar 11 14:50–Mar 12 15:40
Kanagawa 3	NR 16	Yokosuka (Umahori Kaigan), Kanagawa Pref.	Tsunami risk	Road reopened Mar 11 17:30–Mar 12 14:15
Kanagawa 4	NR 1 (Seisho Bypass)	Oiso-cho (Oiso-higashi IC–Oiso-nisshi IC, Kanagawa Pref.	Tsunami risk	Road reopened Mar 11 16:05–Mar 12 15:30



Collapse of Sasago Tunnel ceiling panels on the Chuo Expressway

Overview

Japan began conducting comprehensive structural inspections as a result of the accident

- Time: Sunday, December 2, 2012 at about 8:03 AM
- Location: Inside the Sasago Tunnel on the Chuo Expressway (inbound) (4.7-km tunnel between Otsuki JCT and the Katsunuma IC)
- Description: Tunnel ceiling panels collapsed about 1.7 km from the Tokyo-side exit, crushing three vehicles and catching two of them on fire. Nine people died and two were injured.
- Traffic closures: Inbound between Otsuki JCT and the Ichinomiya-Misaka IC, outbound between Otsuki JCT and the Katsunuma IC)
  (The outbound lanes were divided and opened to two-way traffic at 1 PM on December 29, with two-lane travel in both directions planned for February 8)

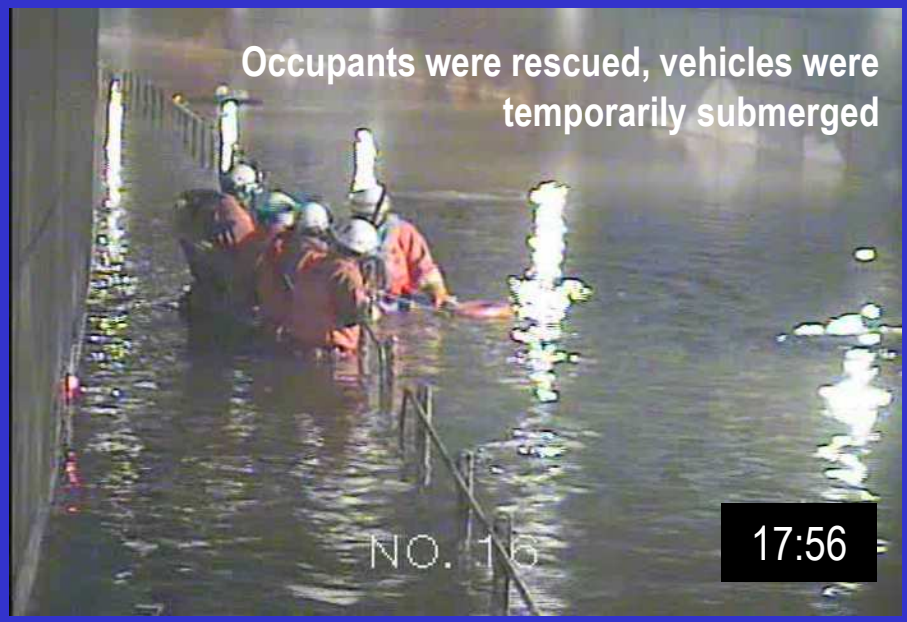

12 PM on December 2


3:30 PM on December 3 (removal of collapsed panels)

Source: Documents from the Council for Social Infrastructure, Road Subcommittee, 42nd Basic Policy Section Meeting (MLIT website)

Measures to address flooded roadways (Kanto)

Flooded underpass during heavy rain (images from tunnel CCTV)



Measures to address flooded roadways (Kanto)

Measures to prevent flooding accidents (on national roads)

- Install “three-part packages” at underpasses
  - Drainage pumps
  - Surveillance cameras
  - Information boards
- **Send out urgent patrols when rainfall reaches 30 mm per hour**
- Strengthen collaboration between road administrators and local police and fire teams
- Announce flooded areas (get the word out to the general public)

Advanced maintenance and management (Kanto)

Information collection

Meteorological observation equipment

Weather information communications equipment

Road conditions in various areas

Intensive round-the-clock management

Roadway Information Room

Collecting information for centralized management

Rapid response

Urgent dispatch when rainfall reaches 30 mm per hour

Information signs

5. Trends in Road Management

Committee on Aging Social Overhead Capital

As Japan's social overhead capital continues to age, it is critical that we strategically manage, maintain, and upgrade it with the aim of protecting the lives of our citizens. We have therefore set up a Committee on Aging Social Overhead Capital and appointed the Minister of Land, Infrastructure, Transport and Tourism as chair with the aim of discussing the necessary measures and steadily implementing them (January 21, 2013)

Committee members

Minister of Land, Infrastructure, Transport and Tourism (committee chair), Senior Vice Minister of Land, Infrastructure, Transport and Tourism, Parliamentary Secretary of Land, Infrastructure, Transport and Tourism, Private Secretary, Chief Engineers, vice ministers, deputy vice ministers, Deputy Vice Minister for Policy Coordination, Deputy Minister for Technical Affairs, Deputy Vice-Minister for Construction, Engineering and Real Estate Industry, Deputy Vice Minister for Risk Management and Transport Safety Policy, Deputy Director-General for Engineering Affairs, Director-General of the Government Buildings Department, Director-General of the Policy Bureau, Director-General of the National and Regional Policy Bureau, Director-General of the Land Economy and Construction and Engineering Industry Bureau, Director-General of the City Bureau, Director-General of the Water and Disaster Management Bureau, Director-General of the Road Bureau, Director-General of the Housing Bureau, Director-General of the Railway Bureau, Director-General of the Road Transport Bureau, Director-General of the Ports and Harbours Bureau, Director-General of the Civil Aviation Bureau, Director of the National Institute for Land and Infrastructure Management, Director of the Geospatial Information Authority of Japan

Immediate measures required for managing, maintaining, and upgrading Japan's social capital (March 21, 2013)

Basic concept

Make use of the FY2012 revised budget and FY2013 initial budget to carry out comprehensive inspections and quickly make the necessary repairs as part of on-site infrastructure management. Then, based the results of the comprehensive inspections , work to formulate a plan for extending the life of these structures in a more extensive way (include an approach to upgrades) starting in FY2014. In formulating the plan, move towards a full-scale implementation of a PDCA cycle that involves management, maintenance, and upgrades. Build on the lessons learned from the Chuo Expressway Sasago Tunnel disaster and other incidents to ensure proper maintenance of the infrastructure so critical to citizens' daily lives and the economic foundations of the country. Take comprehensive and focused action to address the aging of a variety of structures and facilities by defining this fiscal year as the First Year of Full-scale Social Capital Maintenance and outlining the critical and immediate measures that must be implemented over the coming three years.

Source: Documents from the Committee on Aging Social Overhead Capital (MLIT website)

Comprehensive inspections of roadway assets

Purpose

- Conduct inspections to identify facility abnormalities and carry out appropriate urgent measures when needed, working from the perspective of road users and with the aim of preventing damage to third parties.

Applicable road facilities

●Bridges ●Pedestrian bridges ●Road tunnels ●Slope construction/civil engineering structures ●Pavement ●Road signage, lighting equipment, and informational devices

MLIT Road Bureau

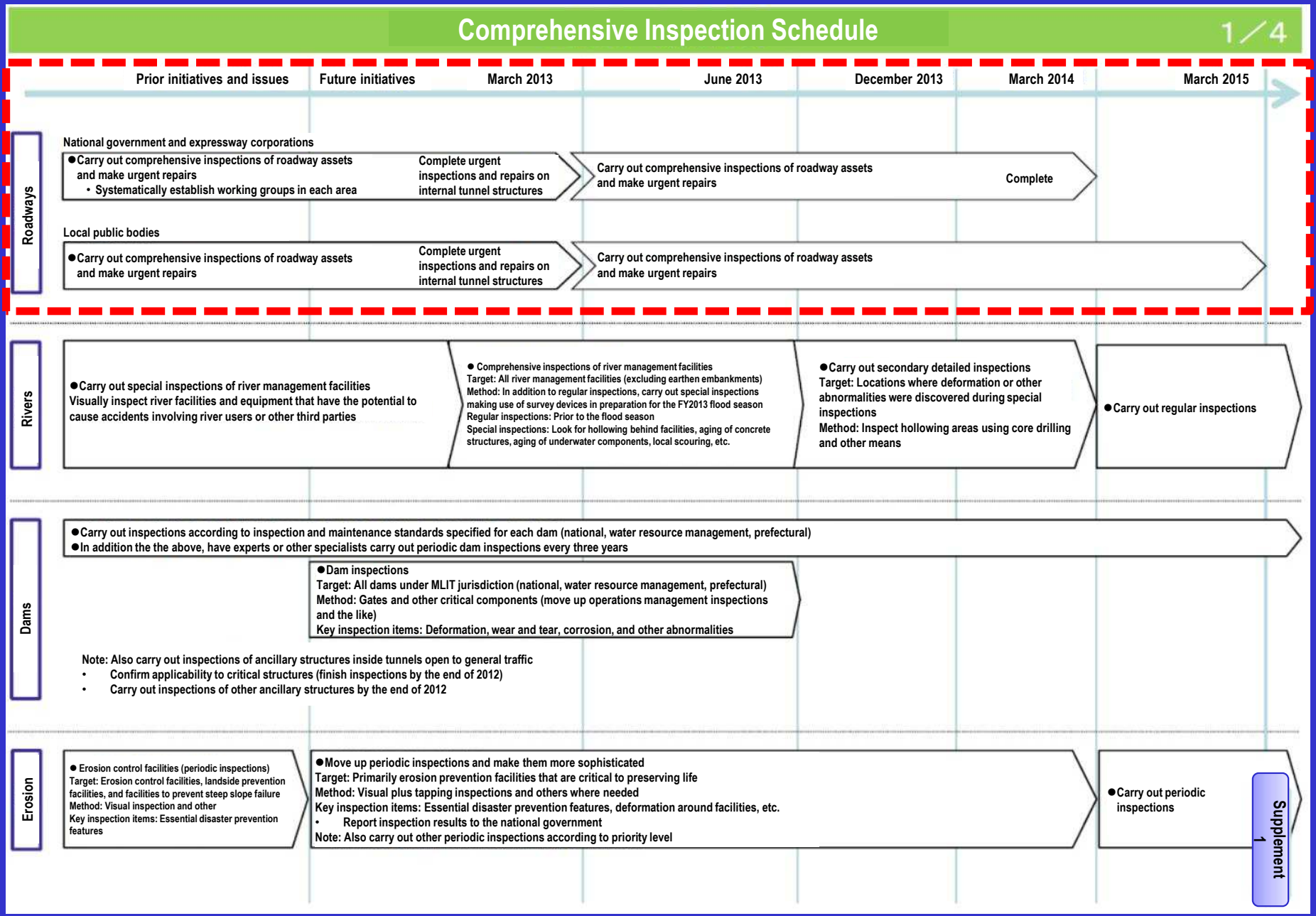
- Head of Planning Division
- Head of National Highway and Risk Management Division
- Head of Environment and Safety Division
- Head of Expressway Division

→

- Regional Development Bureau
- Hokkaido Regional Development Bureau
- Okinawa General Bureau
- Prefectural roads
- Roads in cities designated by ordinance
- Japan Expressway Holding and Debt Repayment Agency
- East Nippon Expressway Company
- Central Nippon Expressway Company
- West Nippon Expressway Company
- Metropolitan Expressway Co., Ltd.
- Hanshin Expressway Co., Ltd.
- Honshu-Shikoku Bridge Expressway Co., Ltd.

Maintenance and management initiatives

Comprehensive Inspection Schedule 1／4



Source: Documents from the Committee on Aging Social Overhead Capital (MLIT website)

Partial amendment to the Road Traffic Act

● Partial amendment to the Road Traffic Act

(Officially announced June 5, 2013)

It is becoming increasingly clear that (1) carrying out road inspections from the standpoint of preventative maintenance, (2) streamlining transportation routes for large vehicles while cracking down on those that violate restrictions, (3) encouraging the removal of utility poles along routes that are critical in terms of disaster management, and (4) getting roads reopened faster when disasters do occur are critical measures if we are to properly manage Japan's roads in the face of aging facilities and the likelihood of large-scale disasters.

Background

- Roads built during Japan's period of high economic expansion are now aging rapidly

Percentage of roadway structures aged 50 years or more
- Bridges: 16% (2012) → (20 years later) → **65%** (2032)
- Tunnels: 18% (2011) → (20 years later) → **47%** (2031)

- Accumulated roadway fatigue due to the passage of heavy vehicles

Hole in bridge

Pavement rutting

- Critical roadways must be secured against the many forms of damage brought by urban earthquakes or massive earthquakes in the Nankai Trough

Clearing roadways after the Great Tohoku Earthquake

Roads damaged in a typhoon

Source: MLIT website

Proposed amendment (overview)

Amendment overview

1. Preventative maintenance and measures to combat aging in roadway structures

Enhanced road maintenance and repairs (addressing hard infrastructure)

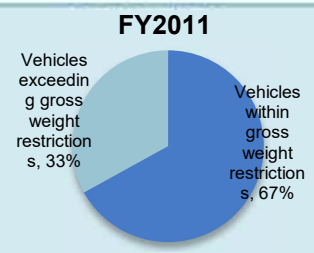
- Carry out repairs and maintenance, including inspections from the standpoint of preventative road maintenance
- Have the Minister* investigate inspection results (e.g. apply to technological development)
- Have the Minister act as an agent for repairs or reconstruction on certain structures

**Minister of Land, Infrastructure, Transport and Tourism*

Inspection of roadway structures

Optimizing large vehicle travel (addressing soft infrastructure)

- Have the Minister give instructions regarding roads configurations built for large vehicle travel
  - ➢ Have the Minister expedite travel permits for certain large vehicles
- Closer supervision of parties related to vehicles that continually exceed restrictions (e.g. in-cab observation)



Laws broken by special vehicles

1. Enhancing measures to prevent and mitigate disaster conditions

- Prohibit/restrict third-party occupation (e.g. third-party objects) on roads constructed as critical disaster management routes (e.g. emergency ring routes)
  - ➢ Have the national government and local public entities offer interest-free loans for the removal of utility poles

Partial revision of the Special Act on Road Assets

- Sign agreements between road administrators and NPOs and similar groups to get roads reopened

Construction of multipurpose utility ducts to allow removal of utility poles

Source: MLIT website

Amendment to the Road Traffic Act (put into force September 2, 2013)

Road Traffic Act

■ **Stipulations for road maintenance and repairs**

Article 42. Road administrators must work to maintain and improve roads in order to keep them in good condition at all times so as to prevent hindrances to general traffic flow.

- 42-2 Ordinances shall stipulate technical standards and other requirements related to road maintenance and repairs
- 42-3 The aforementioned technical standards must include criteria for inspections to ensure that road repairs are carried out efficiently

System for ministerial ordinances and notices related to road maintenance and repair as well as regular inspection standards (Draft)

1) Ministerial ordinances and notices stipulate that close-up visual inspections generally be carried out once every five years and that soundness diagnostic results be classified into four categories (for all tunnels, bridges, and other structures)
2) Periodic inspection standards define specific inspection methods (for each tunnel, bridge or other structure)
3) Periodic inspection guidelines add key locations prone to deformation, example photos to aid with classification decisions, and other resources to ensure that municipal inspections proceed smoothly (for each tunnel, bridge or other structure)

Government ordinance/period inspection standard framework (draft)

Road Traffic Act

↓

Government ordinances

↓

Ministerial ordinances and notices

Officially announced March 31, 2014
Put into force July 1, 2014

↓

Periodic inspection standards
Periodic inspection guidelines

Put into force September 2, 2013

- **Stipulate that maintenance, inspections, and measures must be carried out**

- **Stipulate that periodic inspections must be carried out on tunnels, bridges, and other structures that run the risk of significantly hindering road structure or traffic flow if damage, rust, or other abnormalities due to deterioration should occur.**
- **Close-up visual inspections should generally be carried out once every five years**
- **Soundness diagnostic results must be classified into four categories**

(Tunnels, bridges, and other structures)
Common to all structures

- **Detailed inspection methods tailored to unique structural features and based on ministerial ordinances and notices**
- **Key locations prone to deformation, example photos to aid with classification decisions, etc.**

(Tunnels, bridges, and other structures)
Defined for each structure

Soundness diagnostic categories

■ **Notices and other regulations stipulate the following diagnostic categories for the soundness of tunnels and other structures**

The table below describes the soundness (status) of tunnels or other structures for each diagnostic category.

Category		Status
Ⅰ	Sound	No changes that would threaten structural performance
Ⅱ	Preventative maintenance required	No changes that would threaten structural performance, but measures should ideally be carried out for the sake of preventative maintenance
Ⅲ	Prompt measures required	Changes have the potential to threaten structural performance; measures should be taken promptly
Ⅳ	Urgent measures required	Changes have a significant possibility of threatening structural performance; urgent measures are required

Proclamation on full-scale measures to address aging road facilities (April 14, 2014)

1. Current environment surrounding road infrastructure

(1) Status of road infrastructure

- About 500,000 of the 700,000 bridges are on municipal roads
- Some structures are beginning to show deformation due to aging
- Of the bridges managed by local public bodies, the number that have faced travel restrictions and other issues in the last five years has more than doubled

(2) Challenge of addressing aging facilities

- The budget for direct maintenance and repair has fallen more than 20% in the last 10 years
- About half of all towns and 70% of all villages do not have a civil engineer taking care of tasks to ensure bridge soundness
- Within local public bodies, visual inspections are carried out at a distance, causing many issues in terms of inspection quality

(3) Summary of current status (two core issues)

Minimum rules and standards have not been established ⟷ There is no framework for carrying out a maintenance cycle

2. MLIT initiatives and ideal approach

(1) First Year of Full-Scale Maintenance initiatives

Initiatives to begin implementing a full-scale maintenance cycle

Revisions to the Road Traffic Act (June 2013)
- Establish legally binding inspection standards
- Set up a system where the state can stand in to carry out repairs

Basic Plan to Extend Infrastructure Life (November 2013)
- Liaison meeting of relevant ministries to promote countermeasures to address Japan's aging infrastructure (led to the formulation of the Infrastructure Life Extension Plan (Action Plan)

(2) Ideal approach

(1) Establish a maintenance cycle (2) Set up a framework for carrying it out

Invest all industrial, academic, and government resources (funds, personnel, technology) to boost across-the-board capabilities and begin implementing a full-scale maintenance cycle (All-out Road Maintenance Strategy)

3. Specific initiatives

(1) Establish a maintenance cycle (clarify responsibilities of road administrators)

Every road administrator has the responsibility to carry out the following maintenance cycle

Inspection

- All bridges (nearly 700,000) and tunnels (nearly 10,000) are being monitored through close-up inspection once every five years in accordance with unified national standards
- Pavements, light poles, and other equipment is being inspected and upgraded after an appropriate number of years

Diagnosis

- Use a consistent scale to measure and classify soundness, carry out diagnosis

Road infrastructure diagnosis (Ministerial ordinance/notice officially announced March 31, 2014/scheduled for enactment July 1, 2014)

Category		Status
I	Sound	No changes that would threaten structural performance
II	Preventative maintenance required	No changes that would threaten structural performance, but measures should ideally be carried out for the sake of preventative maintenance
III	Prompt measures required	Changes have the potential to threaten structural performance; measures should be taken promptly
IV	Urgent measures required	Changes have a significant possibility of threatening structural performance; urgent measures are required

Measures

- Repairs must be carried out systematically based on inspection and diagnosis results, and travel must be restricted or roads closed when the necessary repairs cannot be carried out
- Bridges and other structures should be consolidated and eliminated based on usage conditions
- Local public entities that cannot carry out proper measures must be advised or instructed by the state
- Set up a Road Infrastructure Safety Committee to determine the causes of major accidents and discuss ways to prevent recurrence

Records

- Summarize results of inspections, diagnosis, and measures and then evaluate and report them (visually represent results)

(2) Set up a framework to carry out the maintenance cycle

Set up the following framework in order to continuously carry out the maintenance cycle

Budget

- Expressways: Secure the financial resources needed for expressway upgrade projects (normally done by submitting a proposal to the diet for legal revisions)
- Directly-controlled highways: Secure a budget that prioritizes inspections and repairs
- Local roads: Establish a subsidy system to support intensive implementation of major repairs and upgrades over several years

Framework

- Establish a Road Maintenance Council in each prefecture
- Issue regional batch orders and multiple-year contracts for maintenance jobs
- For road facilities that have a major social impact, carry out direct diagnosis using Road Maintenance Engineering Teams made up of state personnel and other experts
- For bridges and other structures that are critical and/or urgent (e.g. overpasses), have the state or NEXCO serve as a proxy to carry out inspections and repairs
- Enhance training for members of local public bodies as well as employees in the private sector

Technology

- Establish proper calculation standards for inspection work and repair projects
- Set up a qualification system in order to ensure that engineers have the knowledge, skill, and practical experience to carry out inspections and diagnosis
- Promote the development of strategic maintenance technologies through academic-industrial-government collaboration

Citizen support and understanding

- Promote initiatives for citizen understanding of the status of aging infrastructure and cooperation with measures to address it

Source: 46th Basic Policy Committee (April 14, 2014)

“Road Maintenance Conferences”

In order to tackle the 3 issues (lack of workforce, lack of technology, lack of funds) that the local public bodies are facing, the government holds “Road Maintenance Conferences” in cooperation with all the prefectures to discuss assistance policies and how to implement and manage those policies.

Current issues

- Due to the **3 issues (lack of workforce, lack of technology, lack of funds)** that the local public bodies are facing, **inspections cannot be completed**, inspection results **cannot be validated and repairs cannot be properly conducted.**

New measures

- The government **holds “Road Maintenance Conferences”** in cooperation with all the prefectures.

<Structure>

The conferences are held with the following members in each prefecture

- Regional Development Bureau (office under direct control) • Local public bodies (prefectures, cities, towns and villages) • Public Road Corporations
- Expressway companies (NEXCO, Metropolitan Expressway Co., Ltd., Hanshin Expressway Co., Ltd., Honshu-Shikoku Bridge Expressway Co., Ltd., designated city expressways and other companies)

<Role>

① Organizing and managing training courses and orientation meetings for explaining standards
② Selecting and approving roads for inspection or repairs in order of priority
③ Aggregating, evaluating and publishing data about inspections and measures
④ Providing support for inspection orders (for example bulk orders in a region)
⑤ Providing technical support

Road Maintenance Conference in progress

“Road Maintenance Conferences” and Other Activities in Okinawa

◆ FY 2014

○ Okinawa Road Maintenance Conferences (1st – 3rd)
- Establishment of meetings, approval of establishment intentions, terms, etc.
- Formulating plans for inspections of roads, bridges and tunnels

◆ FY 2015 -

○ Okinawa Road Maintenance Conferences年　1回～3回開催
- Summary of inspection results of previous year
- Publication of results of previous fiscal year, prospects for inspection of relevant fiscal year, etc.

Road Maintenance Meeting

Support for major local governments

○ **Bridge inspection training 1: once a year**
In order to improve the technical knowledge of the employees of local governments, training courses are organized once a year (4 days) to provide the employees with the essential knowledge and skills necessary to perform inspections.

○ **Bridge inspection practical training (on-site): 4-5 times/year**

○ **Bridge inspection workshops: once a year**
Lecture on latest technologies and methods of bridge maintenance

On-site practical training

6. About the Okinawa General Bureau

Status of Roads in Okinawa

Japanese law classifies roads into four types: expressways, national highways, prefectural roads, and municipal roads. Of these , the Okinawa General Bureau carries out management and maintenance on national highways (in other words, roads directly controlled by the government).

Comparison with national road network

2018 Annual Report of Road Statistics (as of April 1, 2017)

	Nationwide		Okinawa Prefecture	
	Length (km)	Percentage of total	Length (km)	Percentage of total
Expressways	9,100	0.7	57	0.7
National highways	56,111	4.6	502	6.1
Prefectural roads	129,827	10.6	1,082	13.1
Municipal roads	1,034,201	84.1	6,589	80.1
Total	1,229,239		8,230	

Source: Annual Report of Road Statistics 2012 (As of April 1, 2011)

■ National road management classifications

In principle, the administrator for national roads is the Minister of Land, Infrastructure, Transport and Tourism. However, national roads in districts other than those specified in government ordinances (i.e. auxiliary national roads) are typically managed by the prefectural governor. In Okinawa, there are about 332km of road along six routes that are directly managed by the Okinawa General Bureau as they are considered designated districts on national highways within the prefecture. Note that the local agencies that take direct responsibility for projects along these national roads are the two offices and five branch offices listed below.

Office	Branch office	Jurisdiction
North National Highways Office	Nago Branch	Management of NR 58 from Kunigami to Nago and NR 329 in Nago City
	Ishikawa Branch	Management of Route 58 in Onna Village, Route 329 between Ginoza Village and Uruma City, reconstruction work within the Northern National Highway Office jurisdiction, and Yomitan Village
South National Highways Office	Yonabaru Branch	Management of NR 58 within Naha and NR 329, NR 331, and NR 332 form Nishihara to Naha
	Kadena Branch	Management of NR 58 from Yomitan to Urasoe and NR 329 and NR 330 form Okinawa to Nakagusuku
	Naha Airport Branch	Management of Route 58 Urasoe Kita Road, Oroku Road, and Route 506, as well as reconstruction work on Kadena Town and Okinawa City and other areas of Okinawa Island south of the city

General National Highway (designated sector) Management Extension

General National Highway (designated section) management extension (extension of use)

(As of April 1, 2025)

Classification	Road	Start and end points	Extension (km)	Notes
Designated sector	**NR 58**	Kunigami, Kunigami-gun to Naha	153.5	
	(North NHO)	Kunigami, Kunigami-gun to Onna	111.8	
	(South NHO)	Yomitan, Nakagami-gun to Naha	41.7	
	NR 329	Nago to Naha	91.8	
	(North NHO)	Nago to Uruma	50.5	
	(South NHO)	Okinawa City to Naha	41.3	
	NR 330	Okinawa City to Naha	20.5	
	NR 331	Naha to Yonabaru, Shimajiri-gun	51.7	
	NR 332	Naha Airport to Naha	3.0	
	NR 506	Tomishiro to Nishihara, Nakagami-gun	11.7	
	Total		332.2	
	(North NHO)	NR 50 from Onna northward plus NR 329 from Uruma northward	162.3	
	(South NHO)	NR 58 from Yomitan southward plus NR 329 from Okinawa City southward and NR 330, NR 331, NR 332, and NR 506	169.9	

Road Management Division duties

Regarding road maintenance, Article 13 of the Road Traffic Act stipulates the following:

Maintenance, repair, and other management of national roads

ARTICLE 13-2 …Maintenance and repair of national roads… and other forms of management shall be carried out by the Minister of Land, Infrastructure, Transport and Tourism in such *designated districts* as are stipulated by law, while the relevant prefecture shall carry them out for other parts of the road existing within their borders…

This means that each Regional Development Bureau within the Ministry of Land, Infrastructure, Transport and Tourism directly carries out maintenance work in designated districts.

Okinawa is covered in Article 44 of the Cabinet Office Establishment Act, which stipulates the following.

(Affairs under the jurisdiction of the General Bureau)

ARTICLE 44 Within the Cabinet Office, the Okinawa General Bureau shall… and be allocated the following Okinawa-related tasks.

Affairs under the jurisdiction of the following local branches and local administrative agencies:

a. Local offices for the general secretariat of the Fair Trade Commission
b. Local Finance Bureaus
c. Regional Agricultural Administration Offices
d. Bureaus of Economy, Trade and Industry
e. Regional Development Bureaus
f. Regional Transport Bureaus

(2) [Omitted]

This means that the Okinawa General Bureau carries out *maintenance on designated districts of national roads* within Okinawa Prefecture.

Regarding affairs under the jurisdiction of the Road Management Division, Article 68 of the Organizational Regulations for the Okinawa General Bureau stipulate the following.

ARTICLE 68 The Road Management Division shall take charge of the following affairs.

1. Tasks related to road maintenance (aside from those under the jurisdiction of the Construction Administration Division)
2. Matters related to traffic safety measures on roads
3. Matters related to maintenance of multipurpose utility ducts
4. Construction work, construction work design, and construction work maintenance related to road management, traffic safety measures, and maintenance of multipurpose utility ducts based on contracted work from local public bodies and the like
5. Matters related to road construction as part of the execution of projects based on construction or urban planning acts (Act No. 100 of 1968), land district organization acts (Act No. 119 of 1954) or additional laws carried out by other road management divisions
6. Matters related to technical evaluation among those management tasks outside of road maintenance
7. Matters related to surveys and statistical evaluations of construction equipment (excluding telecommunications equipment)
8. Other matters related to construction equipment (excluding telecommunications equipment and affairs under the jurisdiction of the Port and Airport Construction Division) not covered in the preceding item
9. Matters related to technical performance qualifications for operating construction equipment as stipulated in the Construction Contractors Law

In line with the above legal stipulations, the Okinawa General Bureau carries out duties related to general road management (particularly road maintenance and repair projects, traffic safety initiatives, and multipurpose electrical utility duct work) on national roads directly controlled by the Road Management Division (about 331 km in designated districts) with the purpose of ensuring safe, smooth traffic flow and a good roadside environment.

Restricted travel zones

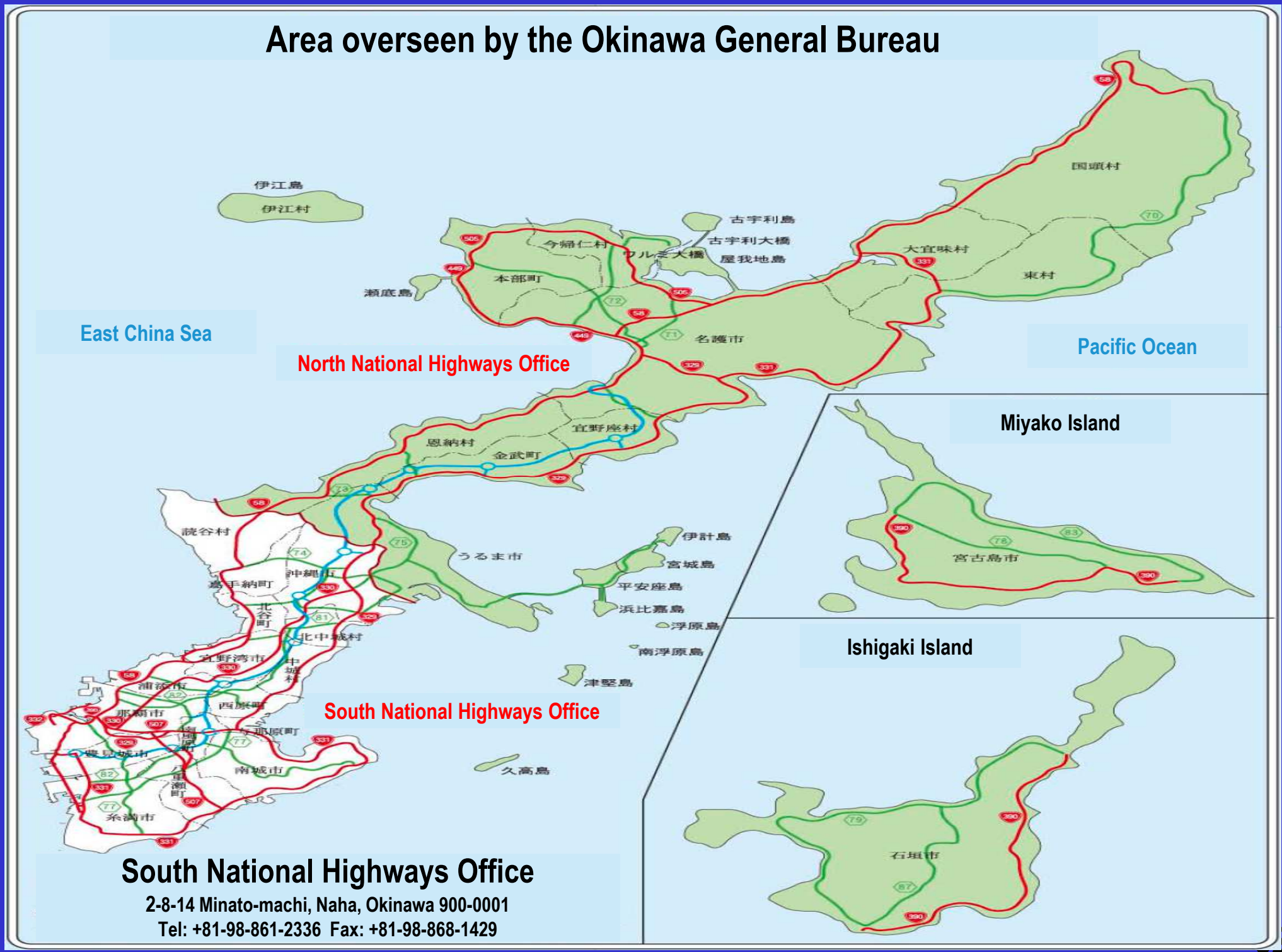
Restricted travel zones

When severe weather such as typhoons or heavy rain is expected to cause destruction, falling rocks, landsides, overtopping waves, or other roadside disaster conditions within the area managed by the Okinawa General Bureau, the road administrator takes steps to prevent accidents and ensure the safety of road users by setting up restricted travel zones in line with Article 46 of the Road Traffic Act.

Restricted travel zones and special restricted travel zones

Restricted travel zones					
Road	Office	Area	Distance indicator	Length	Conditions
NR 58	North National Highways Office	Ginama, Kunigami to Yona Kunigami	12.0 kp–22.36 kp	10.36 km	When there has ben more than 250 mm of continuous rainfall or when tsunami waves overtop the road
Special restricted travel zones					
NR 58	South National Highways Office	Hama, Kunigami to Nerome, Ogimison	30.6 kp–36.8 kp	6.2 km	When tsunami waves overtop the road

Area overseen by the Okinawa General Bureau



South National Highways Office

2-8-14 Minato-machi, Naha, Okinawa 900-0001

Tel: +81-98-861-2336 Fax: +81-98-868-1429

1 South National Highways Office: Overview

Roads managed by South National Highways Office

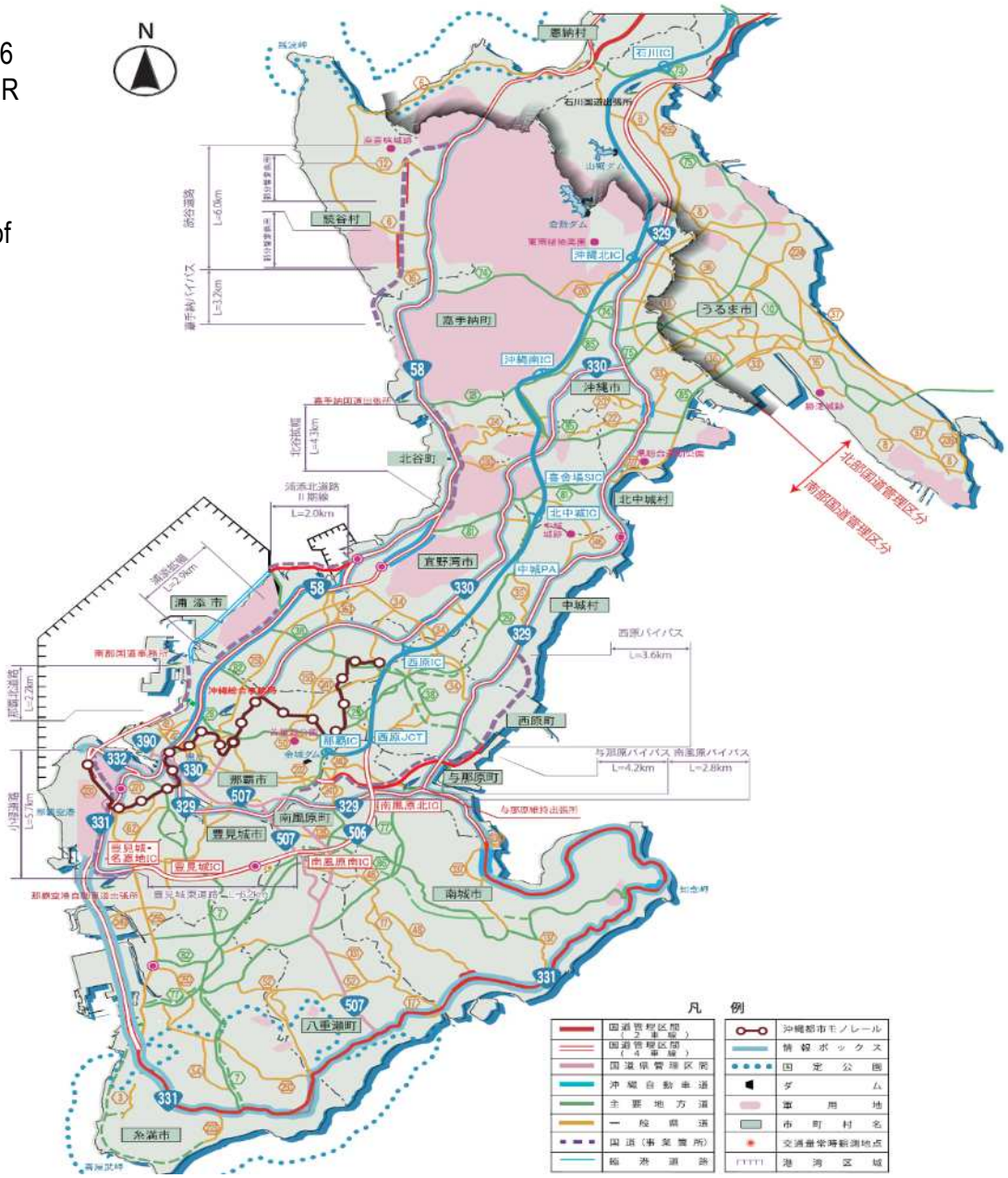
The Southern National Highways Office carries out management and reconstruction for six roads totaling 148,506 km in length in the southern part of Okinawa's main island (NR 58, NR 329, NR 330, NR 331, NR 332, and NR 506 (Naha Airport Road)). There are 320,000 people living within its jurisdiction, primarily in the cities of Naha, Okinawa, Urasoe, Ginowan, Tomishiro and Nanjo. This represents about 80% of the population of Okinawa Prefecture as a whole.
The goal of the SNHO is to ensure that traffic runs safely, comfortably, and smoothly along its highways and to work diligently to help secure and improve the livelihoods of local people while promoting vital industrial activity in the region.

Roads managed by South National Highways Office

Road	District	Actual extension (km)
NR 58	Oyashibaru, Yomitan Onoyama-cho, Naha	(11,962) 26,690
NR 329	Enobi, Uruma Asahi-machi, Naha	(6,040) 35,285
NR 330	1 Teruya, Okinawa City 1 Furujima, Naha	20.535
NR 331	Onoyama-cho, Naha Oyashi, Yomitan	(3,343) 48,366
NR 332	Ashimine, Naha Kakinohana-cho, Naha	2.970
NR 506	Nakachi, Tomigusuku Ikeda, Nishihara-cho	11.660
Total		(21,345) 148,506

(As of April 1, 2023)

Note: Double routes (bypass plus the old highway) are both included in district lengths



Overview of jurisdiction and main business locations

1 North National Highways Office: Status and Challenges

Managed roads

The area managed by the North National Highways Office includes two routes, one extending from Onna north along NR 58 and one from Uruma north along NR 329.

As of April 2021

Road	District	Actual length (km)
NR 58	1-541 Oku, Kunigami 1596-3 Yamada, Onna	92.5 (19.3)
NR 329	4-1 Yofuku, Nago 1037-1 Enobi, Uruma	42.8 (7.7)
Total		135.3 (27.0.)

Note: Figures in parentheses indicate the length along double routes (bypass plus the old highway)
N R 58: Old route through Kijoka, Ogimi
NR 329: Old routes through Ishikawa, Urama and others

▲ **Designated districts under the North National Highways Office**

Restricted travel zones

The office issues travel restrictions (road closures) when overtopping waves and/or heavy rainfall occur in the wake of a tsunami strike to the district.

Road	District			Weather or other conditions	Risks
	Start/end point	Distance indicator	Length		
NR 58	Ginama to Yona in Kunigami	12.14 kp–22.50 kp	10.36 km	When there has ben more than 250 mm of continuous rainfall or when tsunami waves overtop the road	Falling rocks, landslides, overtopping waves

▲ **Preliminary traffic restriction zones**

Road	District			Weather or other conditions	Risks
	Start/end point	Distance indicator	Length		
NR 58	From Hama, Kunigami to Nerome in Ogimi	30.60 kp–36.80 kp	6.20 km	When tsunami waves overtop the road	Overtopping waves

▲ **Special traffic restriction zones**

Challenges

Restricted travel zones on NR 58

Our jurisdiction has about 10.36 km of preliminary travel restriction zone and 6.20 km of special travel restriction zone. Many residents are isolated when restrictions are in effect.

Traffic congestion during the tourist season

In the northern region, traffic concentrates during the tourist season, resulting in significant congestion.

NR 58 Nago - Onna

Traffic congestion on NR 58

Increase in traffic accidents

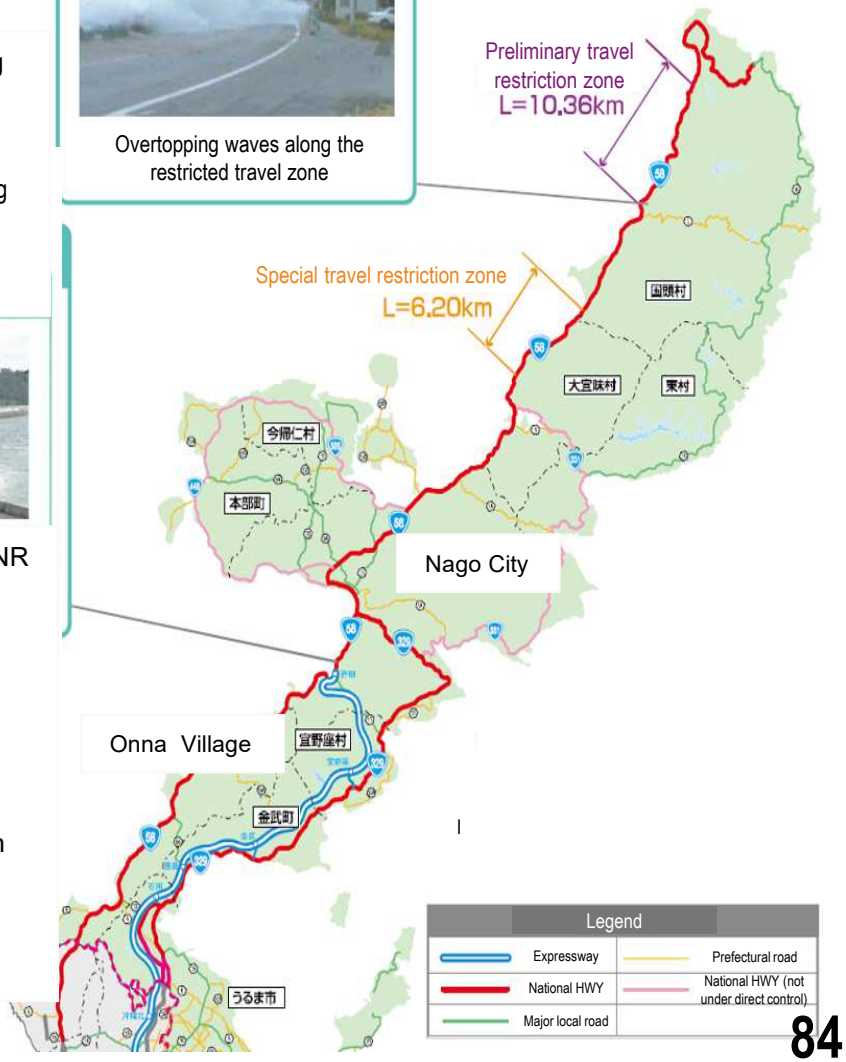
The number of fatal accidents in the jurisdiction has been decreasing in recent years with 121 cases in FY2020, almost the same number as the lowest number of 120 cases in 1996.

NR 58 (Restricted travel zone)

Overtopping waves along the restricted travel zone

Increasing amount of roadkill

Recent years have seen an increase in the number of Okinawa rail birds and crab being killed by cars on the road in Kunigami and other parts of northern Okinawa. The situation is highly problematic.



Okinawa General Bureau road management and maintenance standards

Road management and maintenance policy (draft)

The *Road Management and Maintenance Standards for National Roads (Draft)* (MLIT Road Bureau, March 31, 2011） was recently revised to include the following stipulation: "The purpose of vegetation removal is to limit the overgrowth of weeds so they do not create obstructions within the structural clearance and to ensure visibility for vehicles traveling the road. Therefore, it should generally be carried out in locations identified as having the following overgrowth features."

- Safety cannot be ensured for travel within structural clearance
- Driver visibility of pedestrians, traffic safety equipment, and other structures cannot be ensured

Based on the above stipulations, the Okinawa General Bureau is revising and implementing its FY2011 Road Management and Maintenance Plan as follows.

Through FY2009	Starting in FY2010	Starting in FY2011
Patrols • Daily on weekdays, once every two days on holidays	**Patrols** • Once every two days (as a general rule)	No revisions
Cleaning • Road surface: About 12 times a year	**Cleaning** • Within densely inhabited districts (DIDs): Up to six times year • Other areas: Up to once a year	No revisions
Weeding • About 2–3 times a year	**Weeding** • Once a year (certain locations)	**Weeding** (as needed in the following situations) • When safe travel cannot be ensured within the designated clearance of the structure • When drivers do not have sufficient visibility of pedestrians or traffic safety equipment
Trimming (tall and medium trees) • About once a year	**Trimming** • About once every three years	No revisions

Patrols

Vegetation removal

Cleaning

Trimming

Bridge damage in Okinawa

(6) Damage factors

The three major factors that cause damage to bridges are fatigue, salt, and alkali-aggregate reaction. Of these, Okinawa's bridges are particularly compromised by the region's harsh, high-salt environment. Its bridges also suffer from deterioration over time.

Concrete exfoliation
(salt damage)

Corrosion of steel materials

Deteriorated coatings

Damage to expansion devices

Initiatives to address age-related deterioration in Okinawa

(10) Periodic inspections

- Bridges on national roads are patrolled once every two days and undergo periodic inspection once every five years to ensure that they are sound.

Patrols

Periodic inspections by boat

Using inspection vehicles

Ensuring soundness with close-up visual inspections

Repairs and reinforcements to aging structures in Okinawa

- Periodic inspections are used to detect damages early. Systematic countermeasures are then carried out to address any problems that are found.

R58 Kamenohama Bridge (Onna Village)
Constructed in 1979

R58 Tsumasa Bridge (Onna Village)
Constructed in 1975

R58 Tomaritaka Bridge (Naha City)
Constructed in 1952

Damages

Cracks in the main girder due to salt damage

Cracks in the concrete due to salt damage with swelling as a result

Salt corrosion at girder ends, damaging supports

Countermeasures

Filling cracks

Removal of concrete slab

Concrete slab replaced

Girder ends reinforced with cover plates and coated, supports replaced

Seismic reinforcement in Okinawa

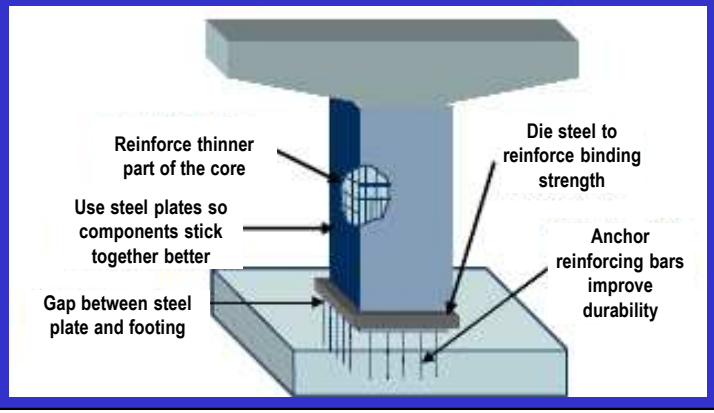
- We are carrying out seismic reinforcement to prevent the falling, collapsing, and other major damages like those sustained by bridges in the Great Hanshin Earthquake.
- Of the bridges built according to pre-1995 standards, 13 of them require seismic reinforcement (92.8% complete).
- Of these, earthquake-resistant measures for those bridges built prior to the 1980 *Specifications for Highway Bridges* were completed in FY2011.
- We are currently working diligently to address bridges that do not yet conform to the 1996 *Specifications for Highway Bridges*.

Damage from the Great Hanshin Earthquake

Damage from the Great Hanshin Earthquake

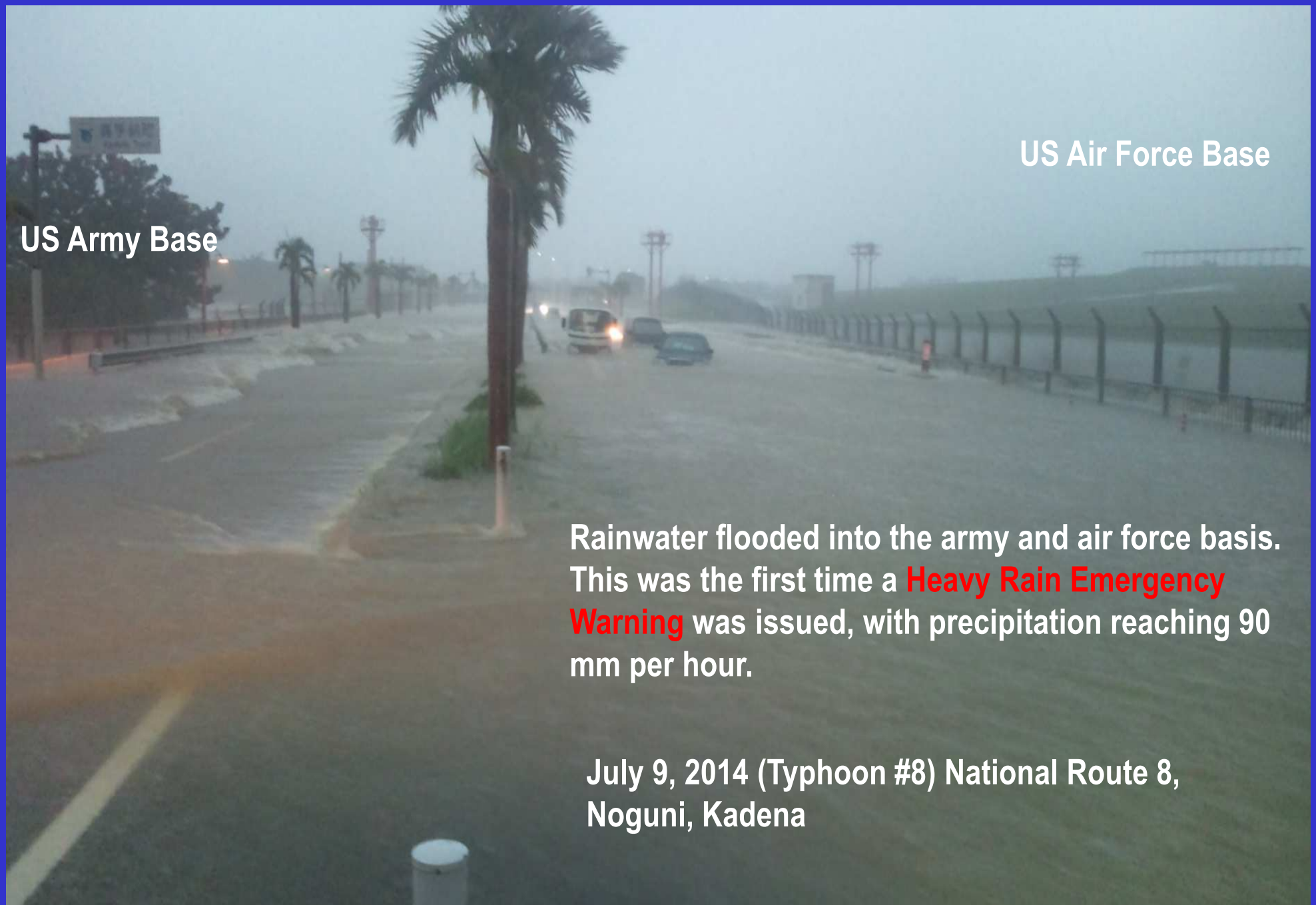
◆ **Bridges requiring earthquake-resistant measures** As of April 2018

	Number of bridges	Countermeasures complete	Progress
Target bridges	181	168	92.8%
Pre-1980 standards	51	51	100%
1980–1995 standards	130	117	90.0%



Example of seismic reinforcement on a substructure (bridge pier)

Flooded roads in Okinawa



Rainwater flooded into the army and air force basis. This was the first time a Heavy Rain Emergency Warning was issued, with precipitation reaching 90 mm per hour.

July 9, 2014 (Typhoon #8) National Route 8, Noguni, Kadena

Flooded roads in Okinawa

Flooded roads in Okinawa

- Flooding due to clogged gutters
  - Floods disappeared in a few hours once fallen leaves, trash, and other debris were removed
- Countermeasure
  - **Prior to typhoons making landfall, patrols and other teams conduct inspections and carry out cleaning tasks as needed**

Drain clogged with leaves, dirt, and other debris

July 9, 2014 (Typhoon #8) National Route 58, Yamada, Onna Village

Emergency hotline #9910

This strategy allows the public to provide us with management and maintenance information. The measure addresses our inability to offer management and maintenance around the clock given our limited staff. There is currently little awareness of the service, but we are spreading the word by establishing agreements with industry groups.

Wrap-up

- Proper management means
  - Ensuring safe, smooth traffic flow
  - Avoiding damages to third parties
- Repairing damages early
  - Extends the life of roadway structures
  - Keeps costs down
- To discover damages early
  - Know what the problems are
  - Conduct daily inspections
  - Keep inspection results in order

We are looking forward to seeing all JICA trainees go out and make a positive impact!

Thank you very much for your attention.