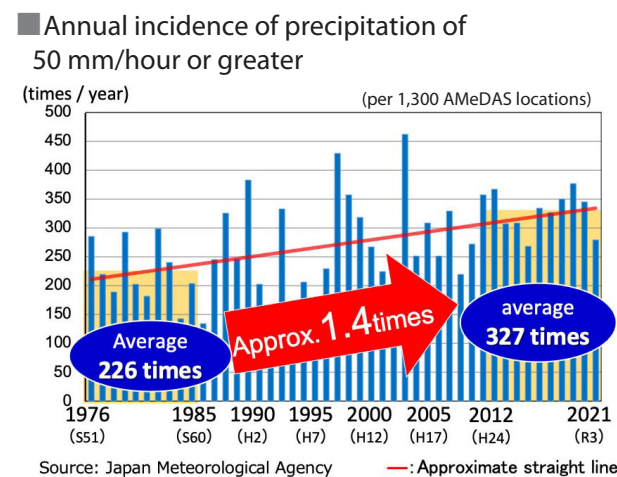


# Disaster prevention and mitigation, national resilience

## - Protect people's lives and livelihoods from disasters -

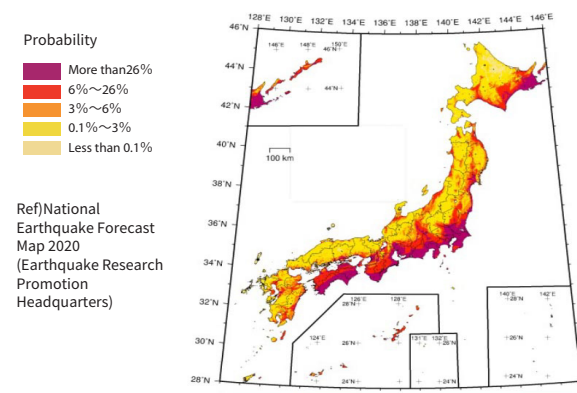
People's lives and livelihoods must be protected from major earthquakes that can occur at any time, and increasingly severe and frequent weather disasters. Based on the Fundamental Plan for National Resilience [Ref.1], with the goal of securing the passage of emergency vehicles within approximately one day, and of general vehicles within approximately one week after a disaster strikes, we will work to build a disaster-resilient road network, and promote efforts to support evacuation, lifesaving emergency and recovery activities, and to strengthen crisis management measures.

### Increasingly severe and frequent weather disasters



### Major earthquakes that can occur at any time

■ Probability of being hit by an earthquake of intensity 6 or higher in the next 30 years



### Disaster-Resilient Road Network Proves Effective (Case Study of heavy rain in 2023)

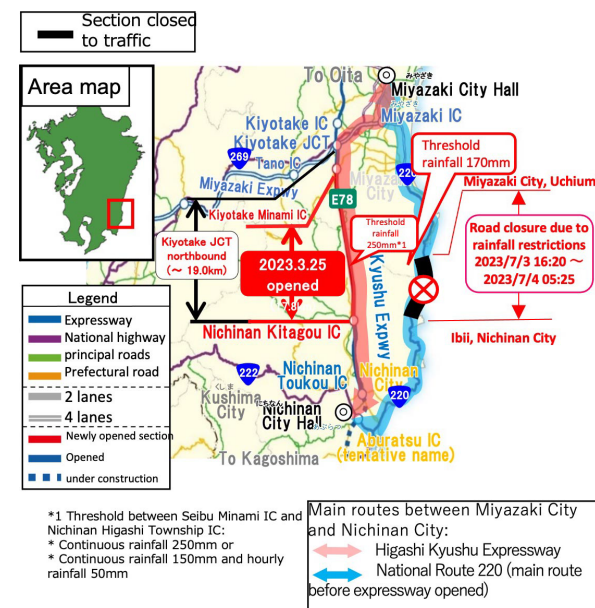
■ Early reopening of four-lane sections to traffic

The Oita Expressway (Asakura IC to Hita IC) was closed to all traffic due to an influx of sand and soil, but two-way operation on the two-lane up carriageway allowed general vehicle traffic to pass after approximately five days.



■ Securing transportation functions through a redundant network

National Route 220 (Miyazaki City to Nichinan City, Miyazaki Prefecture) was closed due to rainfall restrictions, but the Higashi-Kyushu Expressway, which forms a double network, was utilized to secure traffic functions.



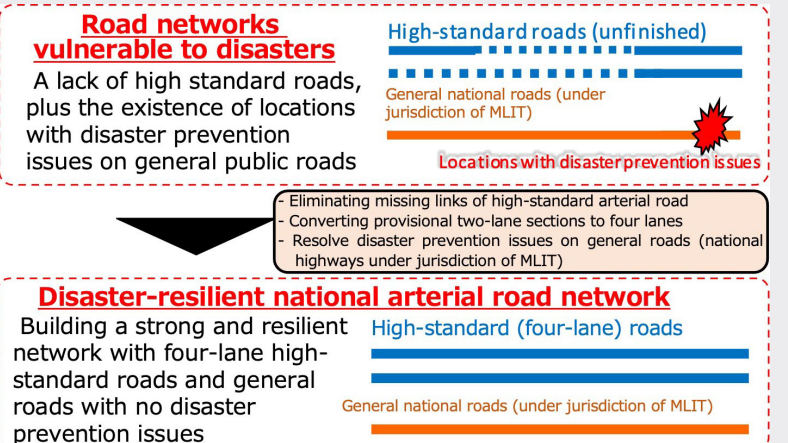
## Radical and comprehensive disaster prevention and mitigation measures to be put in place in advance

Based on the "Five-Year Road Program for Disaster Prevention, Mitigation and National Resilience", we are working to build a national arterial road network that is resilient to disasters, including high-standard roads that are indispensable for maintaining the population living in rural areas and responding to the risk of large-scale disasters, by improving the unimproved sections of high-standard roads and converting provisional two-lane sections to four lanes.

### Background / data

• To ensure the functioning of a disaster-resilient national arterial road network, we aim to secure passage for emergency vehicles within approximately one day after a disaster occurs, and for general vehicles within approximately one week.

• Based on the targets and scale of projects set out in the "Five-Year Acceleration Measures for Disaster Prevention, Mitigation, and National Land Resilience", a "Five-Year Program for Disaster Prevention, Mitigation, and National Resilience" showing the expected progress of specific projects in each prefecture over the five-year period, will be drawn up by regional development bureaus.

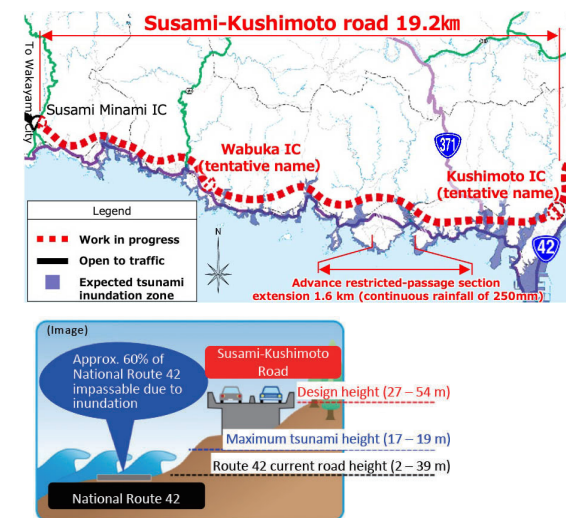


\* Rate of improvement (Ref.1) of missing links on high-standard roads (Ref.2) (2019 → 2025): 0% → approx. 30%

\* Percentage of 4-lane conversion projects in priority improvement sections (Ref.3,4) of high-standard toll roads started (2019 → 2025): approx. 13% → approx. 47%

### Early development of regional security essential networks

A tsunami from a Nankai Trough earthquake is expected to inundate approximately 60% of the parallel National Route 42 section. Emergency transportation road to avoid the expected tsunami inundation area is secured by the construction of the Susami Kushimoto Road.



Ref.1: All or part of the road in service

Ref.2: Missing links on high-standard roads (as of FY2019: approx. 200 sections)

Ref.3: Approximately 880 km section as defined in the Basic Plan for Safety and Security on Expressways (decided September 10, 2019)

Ref.4: As of March 31, 2023, approximately 1,400 km had not been converted to four lanes (including priority improvement sections).

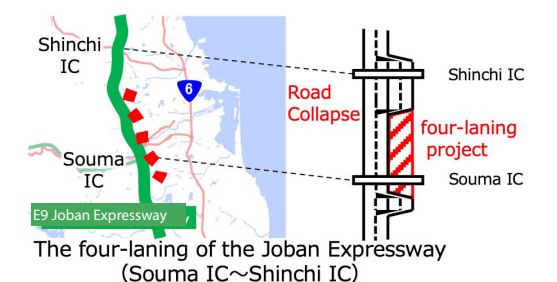
### Conversion of provisional 2-lane sections to 4-lane (Joban Expressway)

In February 2021, an earthquake off the coast of Fukushima Prefecture caused the provisional two-lane section of the Joban Expressway to be closed to traffic due to a collapse of the adjacent embankment. With the completion of the four-lane project currently under way, traffic functions are expected to be secured in the event of a disaster by utilizing lanes not affected by the disaster.

While utilizing the financial resources secured by the extension of the toll collection period, we will promote the conversion of the provisional two lanes to four lanes.



The disaster of the Joban Expressway





## Radical and comprehensive disaster prevention and mitigation measures to be put in place in advance

To build a disaster-resistant road network, we will promote disaster prevention and mitigation measures in line with the increasing severity of recent disasters and newly-identified disaster risks.

### Measures to prevent the loss of bridges at road structures adjacent to rivers

Promote scour and washout prevention measures and bridge replacement to address the risk of bridge and road washout.

Rate of construction work at locations on emergency transport roads that require countermeasures against scouring and loss of bridges at river crossings and structures adjacent to rivers (approx. 1,700 sites): (2019 -> 2025): 0% -> approx. 28%

### Seismic reinforcement of road bridges

Promote seismic reinforcement of bridges on emergency transportation roads (Ref.1). (Measures taken to ensure that even in the event of a major earthquake, only minor damage is sustained and functions can be restored quickly.)

\* Seismic strengthening of bridges on emergency transportation roads (2019 -> 2025): 79% -> 84%

### Countermeasures against pavement damage

Investigate mechanisms of pavement damage specific to snowy and cold regions, and consider countermeasures.

### Prevention of landslide disasters on road slopes and embankments

#### Background / data

Damage characteristic of recent torrential rains, such as the inflow of sand and soil from outside the road area, occurred in various locations.

Promoting efficient and effective countermeasures against newly identified disaster risks through advanced inspection methods by utilizing disaster resistance assessments (risk assessments (Ref.2)).

Consideration of prior traffic control standards utilizing soil rainfall index.

• Rate of construction work at locations on emergency transport roads that require slope and embankment countermeasures: (2019 -> 2025): approx. 55% -> approx. 73%

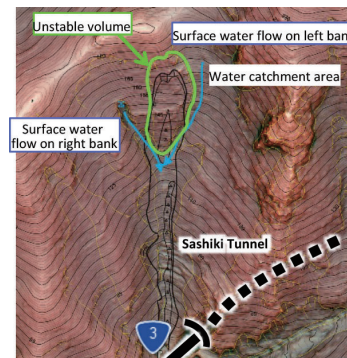
#### Disaster example



Large-scale inflow of sediment  
E8 Hokuriku Expressway  
Heavy rain in August 2022



Large-scale landslide from a slope adjacent to the road area  
National Route 3  
Heavy rain in July, 2020



Examples of advanced inspection methods  
Laser profiler inspection

#### Disaster example



National Route 121 Heavy rain in August 2022

#### Countermeasures



Countermeasures against road washouts on National Route 49  
(Iwaki City, Fukushima Prefecture)

## Radical and comprehensive disaster prevention and mitigation measures to be put in place in advance

We will promote efforts to support evacuation, lifesaving and recovery activities in the event of a disaster.

### The use of elevated sections of roads as inundation evacuations

#### Background / data

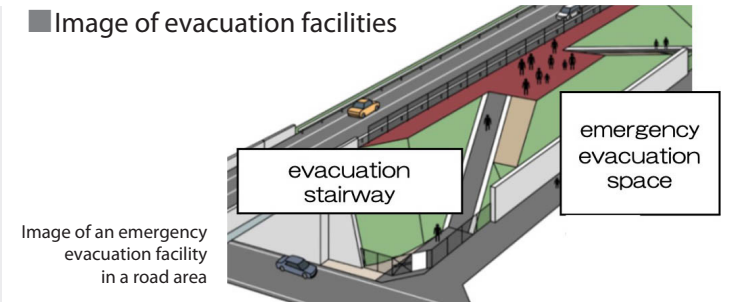
- About 1,800 km of road sections nationwide are higher than the submersion depth of tsunamis and floods. (Ref. 1)
- In the aftermath of the Great East Japan Earthquake, roads were used as emergency evacuation sites, demonstrating their secondary disaster prevention function.

Consideration of risk of flooding due to tsunamis when constructing roads.

Establishment of evacuation facilities in elevated sections to support local governments' efforts to secure emergency evacuation sites.

• Work undertaken on evacuation facilities at locations where elevated sections of national highways under jurisdiction of MLIT must be used as emergency evacuation sites : (2019 -> 2025): approx. 27% -> 100%.

#### Image of evacuation facilities



#### Maintenance case study

Construct ramp to sidewalk higher than expected flood depth (National Route 55, Kochi)



### Road clearing

#### Background / data

- Formulate a series of road development plans based on local conditions.

Promote the development of the necessary systems and equipment for road clearing; formulate and review road clearing plans and conduct training to improve the effectiveness of road clearing.

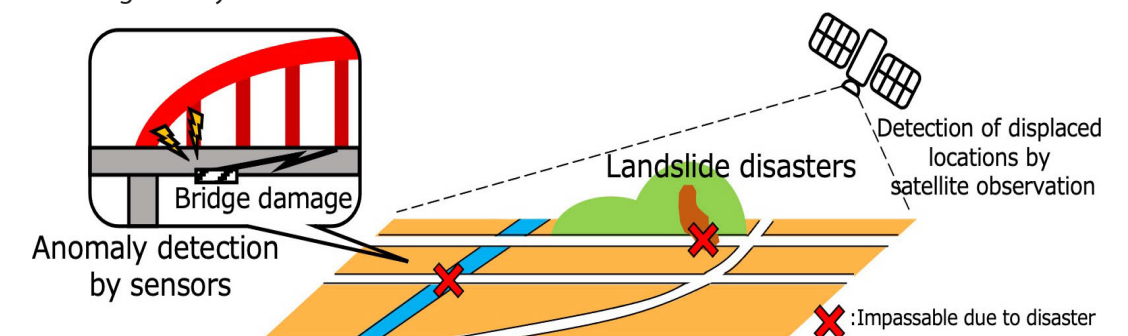
### Prompt collection and dissemination of information

Collect and provide information on passability through cooperation among related organizations.

Promote the enhancement of road management systems by developing information outlets(Ref.2) and promoting the use of drones, bicycles, and motorcycles so that disaster information can be collected and disseminated promptly in the event of a large-scale disaster.

Promote the use of IT technologies such as cameras, sensors, and satellites for road management, and establish a system to remotely monitor road conditions.

#### Image of a system that enables remote confirmation of road conditions





## Radical and comprehensive disaster prevention and mitigation measures to be put in place in advance

In the event of a disaster, we will implement measures to minimize the impact on socioeconomic activities while placing the highest priority on human lives and closing roads.

### Background / data

- With human life as the top priority, the principal emphasis has been shifted onto the avoidance of large-scale vehicle blockages on major roads.
- 75% (Ref.1) of vehicles stranded in winter do not have chains installed.

## Disaster preparedness and cooperation

Establish an information liaison headquarters bringing together related organizations at an early stage.

Implementation of emergency announcements in cooperation with the Japan Meteorological Agency and other organizations when extreme weather conditions such as heavy rain and heavy snow are forecasted.

Strengthen information dissemination to encourage changes in behavior, such as refraining from leaving or taking wide-area detours, through close coordination in response to wide-area road closures.

### Strengthening of wide-area cooperation

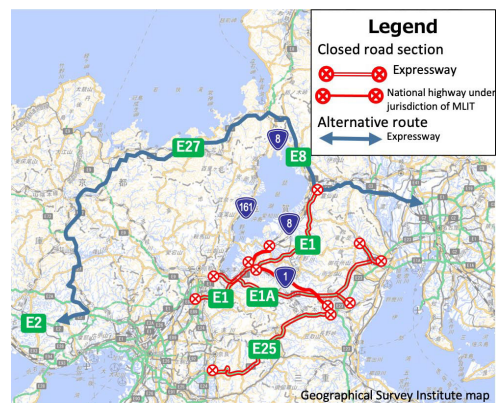
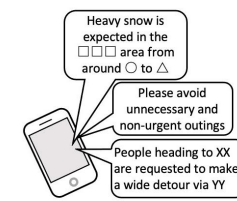


Image of areas requiring wide-area coordination and wide-area detours



Making emergency announcements



Information sharing through SNS

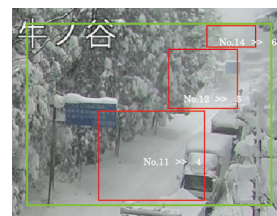
## Winter road traffic security

To avoid vehicle blockage, close expressways and parallel national highways at the same time without hesitation.

Conduct intensive snow removal following road closure to minimize the impact on socioeconomic activities by reopening the road as soon as possible.

Promote the reinforcement and provision of snow removal equipment, snow melting facilities, snow removal stations, automation of snow removal operations, and introduction of automatic traffic obstacle detection systems.

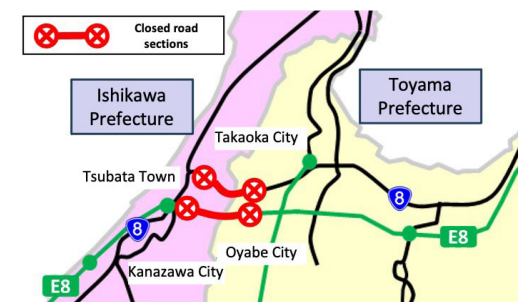
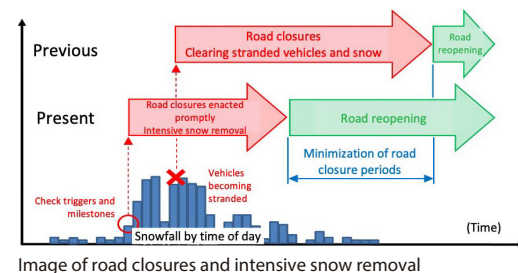
Lend snow removal equipment and provide dispatch support to strengthen the snow removal systems of local governments.



Automatic traffic obstacle detection system



Provision of snow-melting facilities



Simultaneous closure of expressways and national highways under jurisdiction of MLIT (December 23, 2022)



Free rental of small snowplows

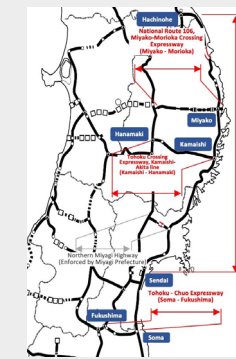
Ref. 1: Survey results on stranded traffic during winter on national highways under jurisdiction of MLIT in FY2022

## Recovery and reconstruction from large-scale natural disasters

We will promote road disaster recovery projects for the earliest possible restoration and reconstruction of areas severely damaged by natural disasters

### Background / data

#### Recovery from the Great East Japan Earthquake



- Reconstruction road and Reconstruction support road (550km) for the Great East Japan Earthquake in 2011 fully opened on December 18, 2021.
- Sections started after an earthquake will be open in about 8 years on average.
- opened in 6 years at the earliest.
- The opening of the entire line has greatly reduced travel time between cities.  
 (Before the earthquake (Mar. 2011) -> After the line was fully opened (Dec. 2021)

\* Sendai - Hachinohe: From approx. 520 min. to approx. 320 min.

\* Sendai - Miyako: From approx. 330 min. to approx. 210 min. Before the earthquake, National Route 45 and the already-opened Sanriku Coastal Highway were used.

\* Soma - Fukushima: From approx. 80 min. to approx. 50 min.

• Boost various effects such as expansion of the population in the area and increase in factory locations and capital investment along the route.

- Regional population (Miyako City): approx. 76,000 (2011) -> approx. 109,000 (2022)
- Capital investment along the route: approx. 4.1 billion yen (276 new factory locations) (2011 - 2021)

## Early traffic security through emergency-assembly bridges

In the event that a bridge is washed away, the national government can provide emergency-assembly bridges upon local government request to help secure traffic as soon as possible.

### Examples of emergency-assembly bridge deployment



Heavy rain from the seasonal rain front in July 2023 (National Road No. 445 (Kaneuchi Bridge): Kumamoto Prefecture)



## Disaster recovery projects on behalf of local governments

If restoration of local government managed roads requires advanced technical capabilities, the national government can implement disaster restoration projects on behalf of the local governments upon request, to speed up disaster recovery.

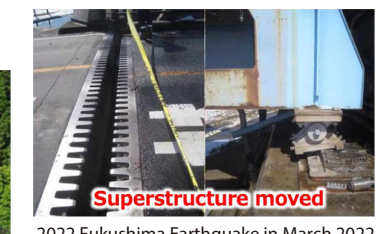
### Examples of authority delegation



Road collapse



One lane secured for emergency restoration



2022 Fukushima Earthquake in March 2022 (Date Bridge, Fukushima Prefecture)

