

# FY 2025 JICA Road Maintenance Training

# Road Disaster Prevention Measures

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<sup>\*</sup> When using this text, please note that part of this text has been taken from the training material used for road management training at the College of Land, Infrastructure, Transport and Tourism, which has been rearranged, revised, and modified at places.



- 1. Characteristics of Recent Disasters
- 2. Disaster Management Related Systems
- 3. Response During Disasters
- 4. Road Disaster Prevention Measures
- Disaster Prevention Measures of the Okinawa General Bureau



# 1. Recent Disasters

- 1 Earthquakes and Tsunami
- 2 Volcanic Eruptions
- 3 Severe Rains
- 4 Heavy Snowfalls

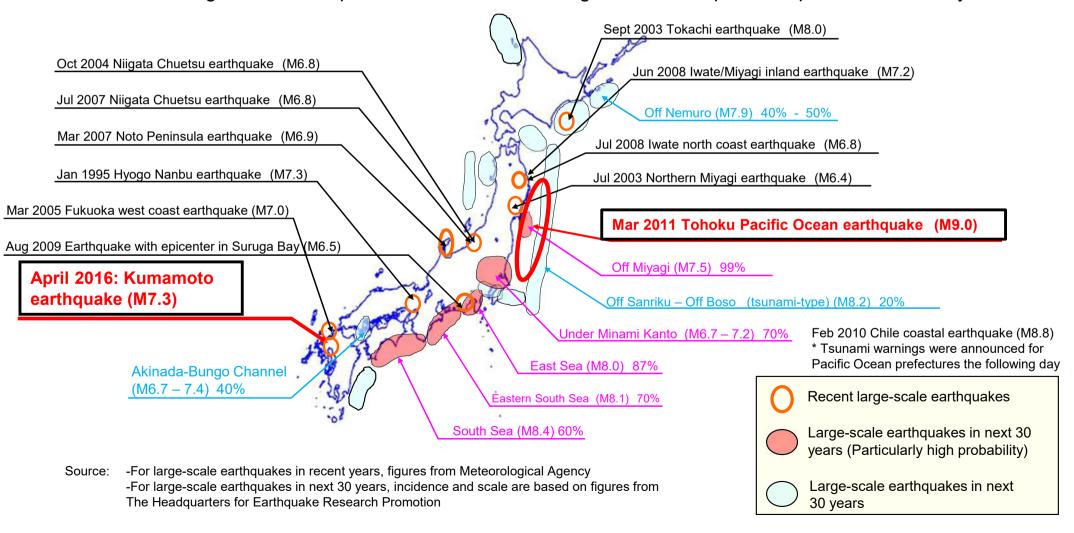
# Japan (Earthquakes and Tsunami)



■ Japan accounts for about 20% of the major earthquakes (M6 or higher) in the world, making it one of the most earthquake-prone countries in the world.

Examples: June 2008 Iwate/Miyagi inland earthquake, Aug 2009 Suruga Bay earthquake, Mar 2011 Tohoku Pacific Ocean earthquake, April 2016 The Kumamoto earthquake

Recent large-scale earthquakes and tsunami and large-scale earthquakes expected in next 30 years



### Tohoku Pacific Ocean Earthquake Earthquake Overview



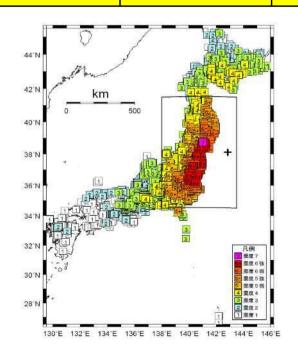
### Name of Earthquake

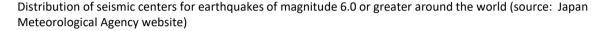
#### Date of Incidence

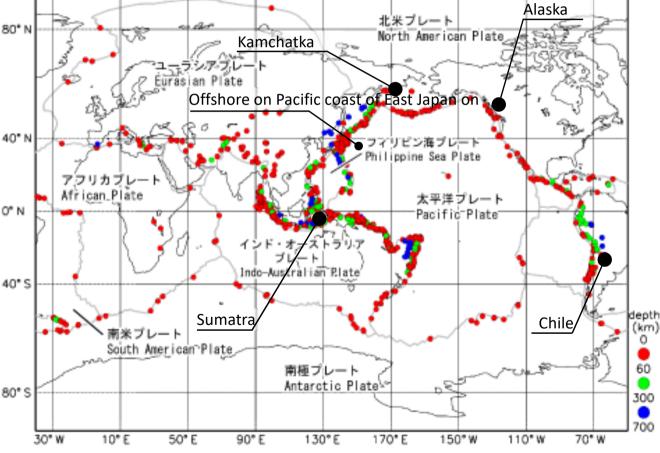
# Tohoku Pacific Ocean Earthquake 2:46PM March 11, 2011

※This was the fourth largest earthquake observed around the world since 1900.

	Occurrence date & time	Earthquake name	Magnitude (Mw)
1	May 23, 1960	Chilean Earthquake	9.5
2	March 7, 2006	Great Alaskan Earthquake	9.2
3	December 26, 2004	Sumatran Earthquake	9.1
4	November 5, 1952	Kamchatka Earthquake	9.0
	March 11, 2011	Great East japan Earthquake	9.0



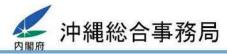




Note: 2003 to 2012

Source: Image prepared by Japan Meteorological Agency, based on seismic center data provided by the United States Geological Survey

# Magnitude and Seismic Intensity



# What is the difference between magnitude and seismic intensity?

- O "Magnitude" is an indicator of the size (scale) of an earthquake.
- O "Seismic Intensity" is the severity of shaking at the place we live when an earthquake of a certain size occurs.
  - O Relationship between magnitude and seismic intensity
  - Even if the magnitude of the earthquake is less as the distance from the epicenter decreases, the ground shakes more severely and the "Seismic intensity" increases.
  - Even if the magnitude of the earthquake is more as the distance from the epicenter increases, the ground does not shake so much.
    - "Seismic intensity" becomes small.



# Summary of Kumamoto Earthquake from 2016



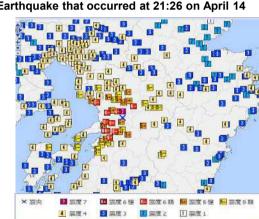
- O Name of earthquake: 2016 Kumamoto Earthquake
- O Date and time of occurrence: April 16, 2016 at 1:25, magnitude 7.3
- \* April 14 at 21:26 (M6.5) and April 16 at 1:25 (M7.3), maximum seismic intensity observed in Kumamoto Prefecture.

Maximum seismic intensity of greater than M6 (twice) since April 14 at 21:26 and just under M6 (three times), while M3.5 or greater occurred 250 times, which exceeded the count for Niigata-Chuetsu Earthquake and the like.

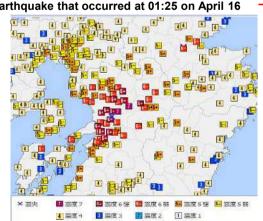
#### Seismic intensity distribution d iagram

#### Earthquakes with seismic intensities of i ust under 6 or greater

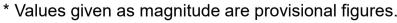
#### Comparison of principal earthquake frequencies that occurred inland as well as along coastal areas (Magnitude 3.5 or greater)

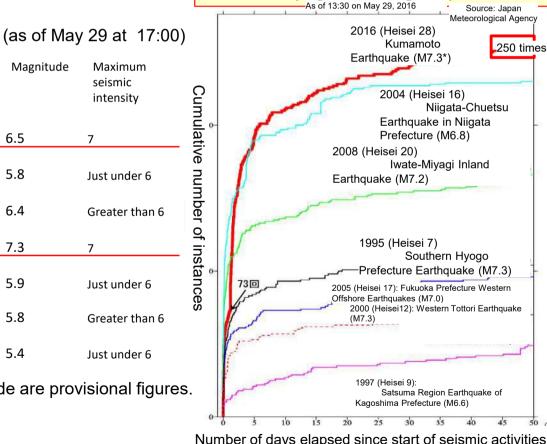


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			(as of ivia)	/ 23 at 17.00)
Time of occurrence		Epicenter location name	Magnitude	Maximum seismic intensity
April 14	21:26	Kumamoto region	6.5	7
April 14	21:07	Kumamoto region	5.8	Just under 6
April 15	00:03	Kumamoto region	6.4	Greater than 6
April 16	01:25	Kumamoto region	7.3	7
April 16	01:45	Kumamoto region	5.9	Just under 6
April 16	03:55	Aso region	5.8	Greater than 6
April 16	09:48	Kumamoto region	5.4	Just under 6





Number of days elapsed since start of seismic activities

<sup>\*</sup> Figures provided in this document are based on preliminary report values and as such, they may change according to findings resulting from survey \* The number of elapsed days, as well as cumulative number of days are indicated since the start of the current earthquake at 21:26 on 14th

<sup>\*</sup> Figures for the current earthquake indicates the cumulative number primarily for Kumamoto region of Kumamoto Prefecture

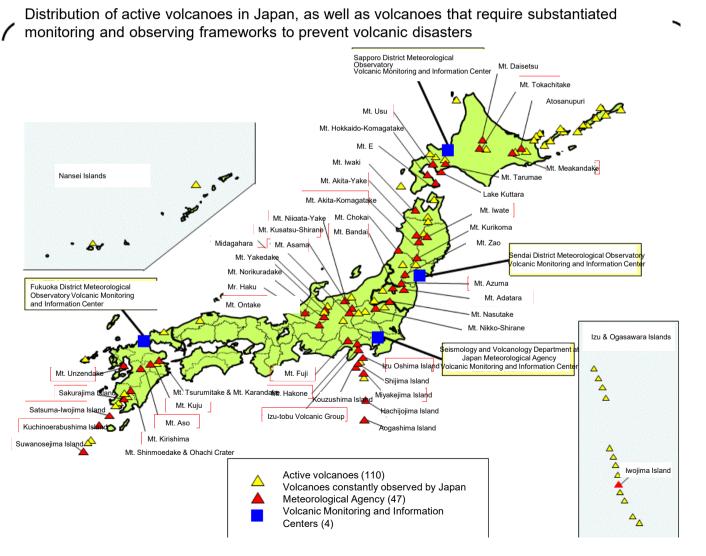
<sup>\*</sup> The magnitude figures for the current earthquake represents maximum values so far.

# Japan Nation Under Constant Onslaught of Disasters (Volcanic Eruptions)国土交通省

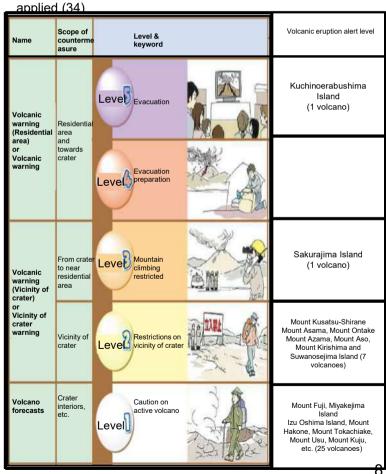
■ Japan is a nation of volcanoes and earthquakes where approximately 10% of all volcanoes of the world are located and where about 10% of earthquakes in the world occur.

Volcanic eruptions of recent years include the eruption of <u>Mount Ontake (Nagano and Gifu Prefectures)</u> in 2014, which took lives of many mountain climbers, while in 2015

there was an increasing number of volcanic earthquake at <u>Mount Hakone (Kanagawa Prefecture)</u>, with tremendous explosions occurring on <u>Kuchinoerabushima Island and Sakurajima Island (Kagoshima Prefecture)</u>.



Volcanoes for which volcanic eruption alert level has been

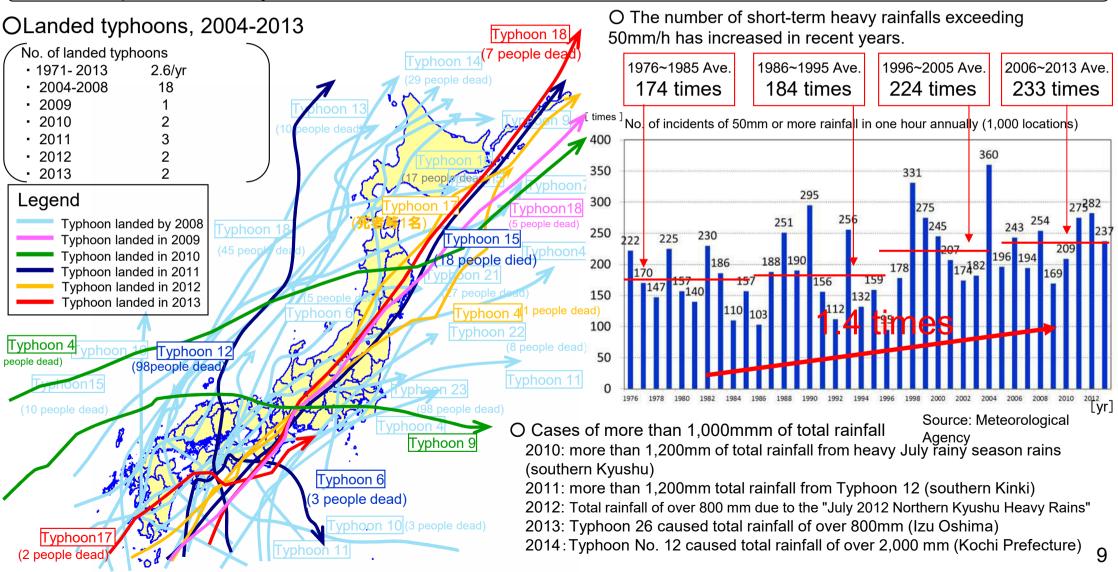


# Disaster-Prone Japan (Wind and Flood Damage )





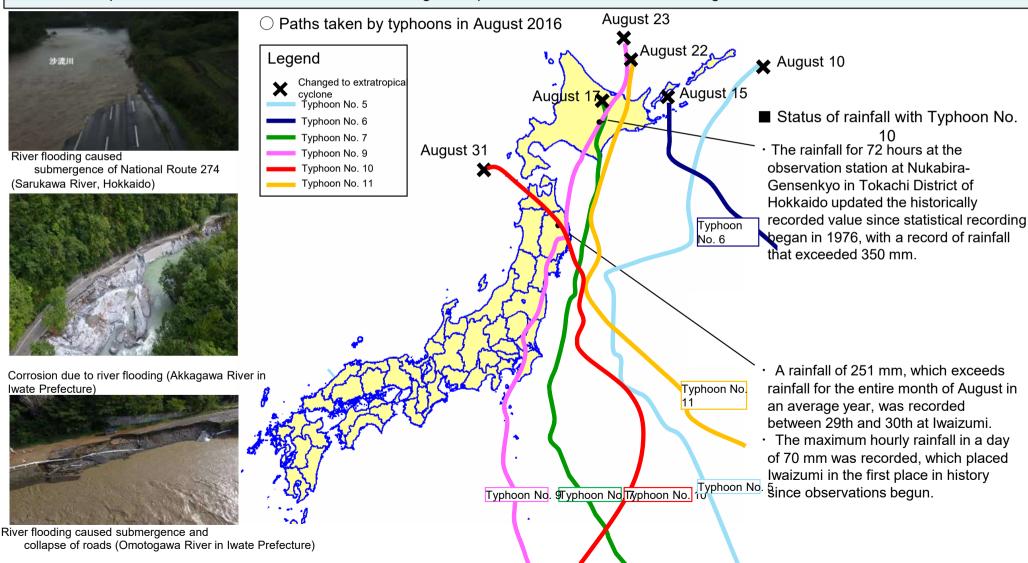
Japan has many steep mountains, and high annual rainfall of about 1,700mm (world average is about 1,000mm), placing it at high risk of disasters from heavy rains due to rainy seasons and typhoons. In recent years, heavy rains hit northern Kyushu in July 2012, and in September 2015, the maximum 24hour rainfall in the Kanto and Tohoku regions broke all-time records at many observation points with statistical periods of 10 years or more.



#### Paths taken and principal rainfalls of typhoons in August 2016



- Osix typhoons either made landfall or approached to proximity of East Japan in August. It was the first time since statistical records started in 1951 that three typhoons landed within a week on Hokkaido as they landed on the Pacific seaboard of Tohoku Region.
- The rainfall that exceeded the amount of rainfall for August in average year of 161 mm per month was recorded in Ikutora District of Hokkaido in a single day, where precipitation of 168 mm per day was observed.
- The rainfall that exceeded the amount of rainfall for August in average year of 157 mm per month was recorded in Iwaizumi Town of Iwate Prefecture in a single day, where precipitation of 194 mm per day was observed.
- O Road collapses, abutment rear side corrosions and bridge collapses occurred due to river flooding.



# Notes on Severe Rainfall in Northern Kyushu Region



The rainfall on July 5, 2017 was the highest in the recorded history since statistical records started at Asakura City of Fukuoka Prefecture. Maximum daily rainfall was 516.0 mm, while maximum hourly rainfall was 129.5 mm. The maximum rainfall for ten minutes of 28.5 mm was recorded.

[Vicinity of Mameda District on Kagetsukawa River of Chikugogawa River System]

[Submerged National Route 386]



Mount Hiko (Soeda Town in Tagawa County)

314.0 mn

Asakura

(Asakura City)

586.0 mm

[Rainfall between 5th and 6th of July, 2017]

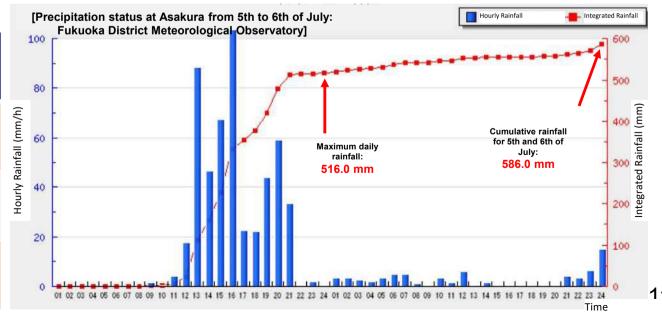
(AMeDAS rainfall distribution; Japan Meteorological Agency)

(Nakatsu City)
305.5 mm

(Nita City)
402.5 mm

[Rainfall observation record at Asakura: Japan Meteorological Agency]

	Rank in observation history: 1st place	Rank in observation history: 2nd place
Maximum Daily Rainfall	516.0mm	214.5 mm (June 22, 2016)
Maximum Hourly Rainfall	129.5 mm	74.5 mm (August 15, 2009)
Maximum Ten-minute Rainfall	28.5 mm	23.5 mm (June 22, 2016)



# Characteristics of Disasters Sustained from Severe Rainfall in Northern Kyushu Region



- O Downpour with continuous rainfall that exceeded 500 mm started on July 5, which caused immense disasters at Asakura City and Toho Village in Fukuoka Prefecture as well as Hita City in Oita Prefecture.
- O A large number of roads were cut off due to the massive sediment runoffs that included fallen trees, as there are many roads in mountainous areas.
- O Roads that run parallel to rivers were also scoured due to river flooding, which resulted in a large number of roads collapsing.

[Asakura City in Fukuoka Prefecture]

Road cutoff due to influx of sediments



Prefectural Road No. 52 at Sada in Asakura City

Road cutoff due to collapsed slope



Prefectural Road No. 590 at Haki-Masue in Asakura City

[Toho Village in Asakura Country of Fukuoka Prefecture]

O Road cutoff due to collapsed slope



Tsuzumigawa Bridge on National Route 211 in Fukui District of Toho Village

Road collapse due to river flooding



National Route 211 at Koishiwatsuzumi in Toho Village

[Hita City of Oita Prefecture] ○ Road collapse



Prefectural Road No. 107 at Tsurukawachi in Hita City

Road collapse due to river flooding



Prefectural Road No. 107 at Ono in Hita City

### Rapid Restoration Work (TEC-FORCE, Agreements, Article 76-6

of the Act on Disaster Countermeasures)



Nation-wide regional maintenance bureau TEC force gathered in Kyushu, developed support activities for disaster areas, and implemented survey of disaster situation and technical support for affected local governments in various fields such as rivers, roads, and drone troops.





Damage survey of river bank



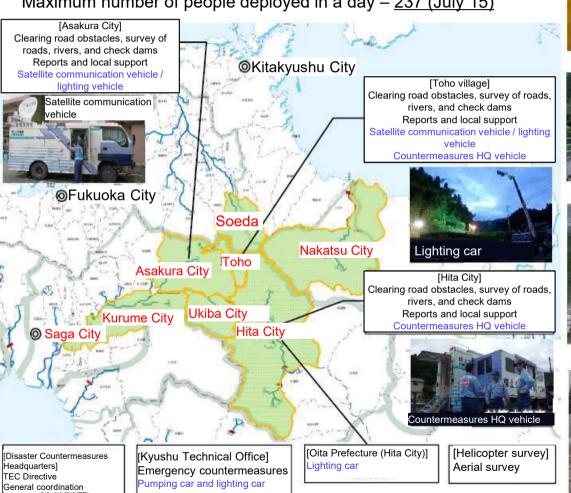
▲Survey of check dams



From all over the country TEC-FORCE was deployed to affected areas

A total of 3,441 people /day (until August 16)

Maximum number of people deployed in a day – 237 (July 15)



▲Survey on road damage



▲ Road development work



▲ Drone survey from TEC-FORCE



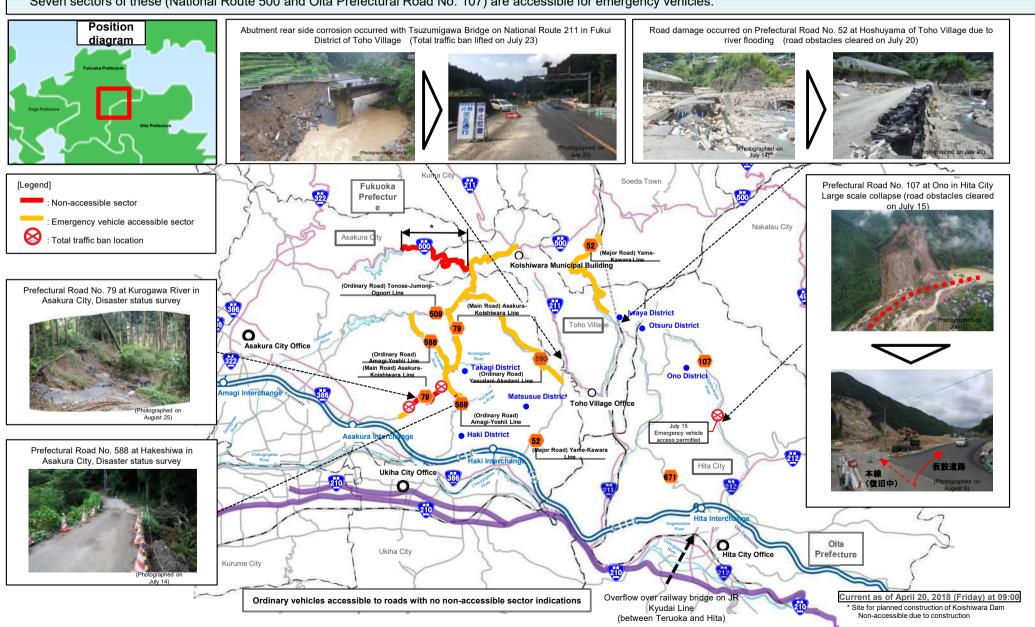
Removal of driftwood from sea

#### Status of Road Related Disasters Due to Severe Rainfall in

#### Northern Kyushu



- O National and Prefectural Roads that span maximum of 117 sectors in northern region of Kyushu were closed for traffic due to damages sustained from severe rainfall that started on July 5.
- Damages concentrated particularly with subsidized national roads and prefectural roads that run through Asakura City and Toho Village of Fukuoka Prefecture and Hita City of Oita Prefecture.
- O Roads are closed for traffic in 18 sectors (1 sector of subsidized national road and 17 sectors of prefectural roads) at the present point in time. (Current as of 06:00 on August 3) Seven sectors of these (National Route 500 and Oita Prefectural Road No. 107) are accessible for emergency vehicles.



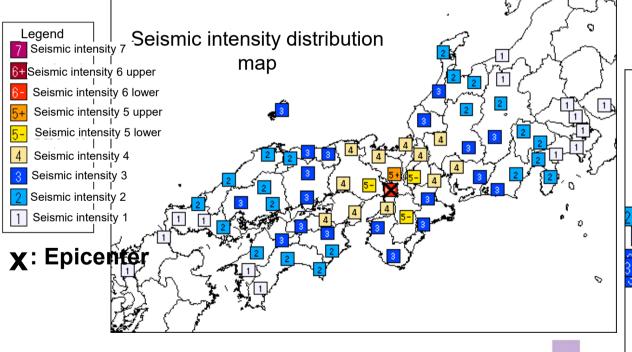
### Northern Osaka Prefecture Earthquakes (2018)



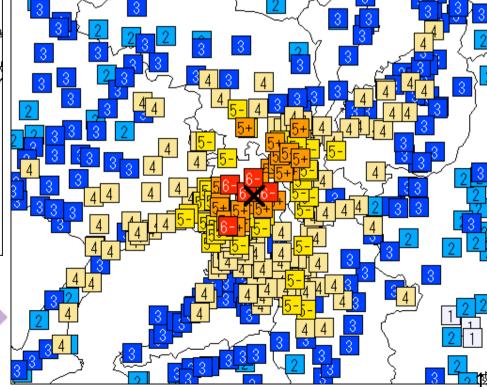
#### O Date and time of occurrence June 18, 2018, 7:58 AM, magnitude 6.1

Seismic intensity

- Lower 6: Chayamachi, Kita, Osaka; Takatsuki Municipal Second Junior High School; Oogaito, Hirakata-shi; Higashichujocho, Ibaraki-shi; Aogein, Minoh-shi
- Upper 5: Miyakojimahondori, Miyakojima, Osaka; Kitaeguchi, Higashiyodogawa, Osaka; Omiya, Asahi-ku Osaka, Kikawa-higashi, Yodogawa-ku, Osaka; Sone-minamimachi, Toyonaka-shi; Toyonaka city hall; Uchihonmachi, Suita-shi; Momozonocho, Takatsuki-shi; Fire-fighting Headquarters, Takatsuki-shi; Neyagawa city hall; Minoh, Minoh-shi; Mishima, Settsu-shi; Kisabe, Katano-shi; Wakayamadai, Shimamotocho
- Lower 5: Fukushima, Fukushima-ku, Osaka; Kasugade-kita, Konohana-ku, Osaka; Chikko, Minato-ku, Osaka; Chibune,
  Nishiyodogawa-ku, Osaka; Kunijima, Higashiyodogawa-ku, Osaka; Shariji, Ikuno-ku, Osaka; Osaka International Airport; Jonan,
  Ikeda-shi; Keihanhondori, Moriguchi-shi; Shinmachi, Daito-shi; Nakano, Shijonawate-shi; Yono, Toyonocho, Choyakuba, Nose



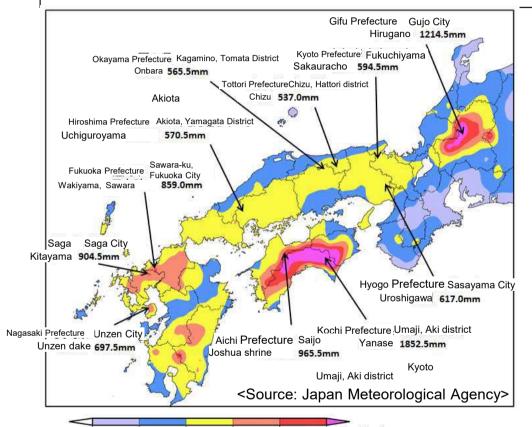
#### Detailed map of places near the epicenter



### Heavy Rain in July 2018

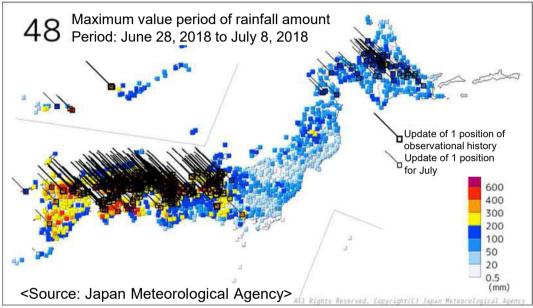


- O Due to the influence of the weather front and Typhoon No. 7, there were heavy rains over a wide area centered around West Japan, which caused floods, landslides, debris flow due to river bank breakdown, and overflowing at many places.
- O 15 measuring stations in Kochi, Gifu, Nagano and Tokushima prefectures recorded a total precipitation (June 28 to July 8) of more than 1,000 mm during the period.
- O It was a record-breaking rainfall that revised the values of the maximum precipitation in 48 hours so far recorded at 124 measuring stations in Hiroshima, Gifu etc.



[Precipitation distribution map during the period] Period: 12:00 midnight on June 28 to 12:00 midnight on July 8 [Special heavy rain warning]

Special heavy rain warnings were issued in 11 prefectures, namely, Nagasaki prefecture, Saga prefecture, Fukuoka prefecture, Hiroshima prefecture, Okayama prefecture, Tottori prefecture, Hyogo prefecture, Kyoto prefecture, Gifu prefecture, Ehime prefecture and Kochi prefecture, from July 6 to July 8.



Distribution map of the maximum precipitation values in 48 hours during the period (12:00 midnight on June 28 to 12:00 midnight on July 8)

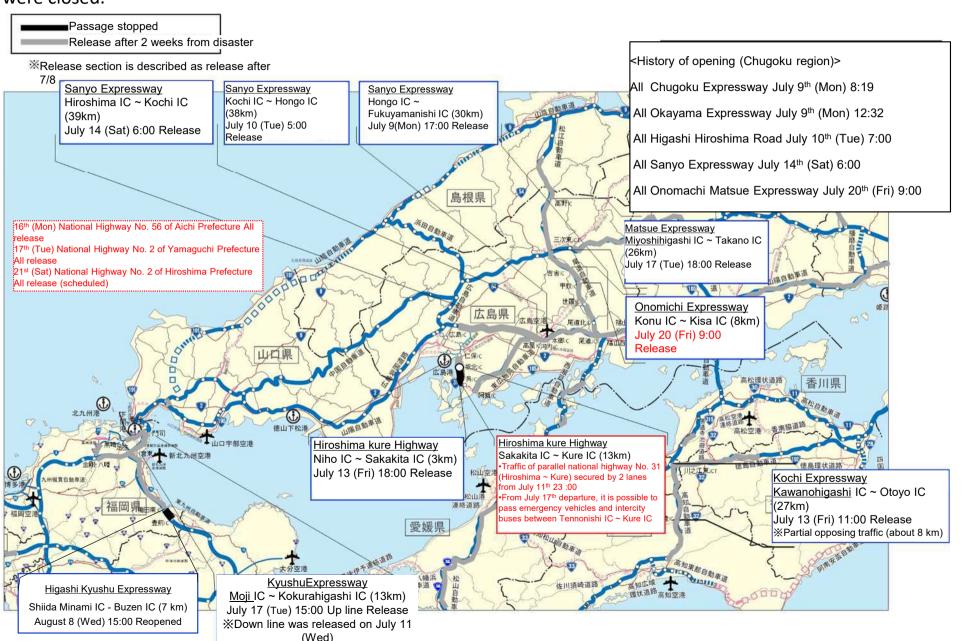


[In the vicinity of Mabi town on the bank of Odagawa river in Takahashi River system (Okayama prefecture)]

### **Status of Closed Expressways**

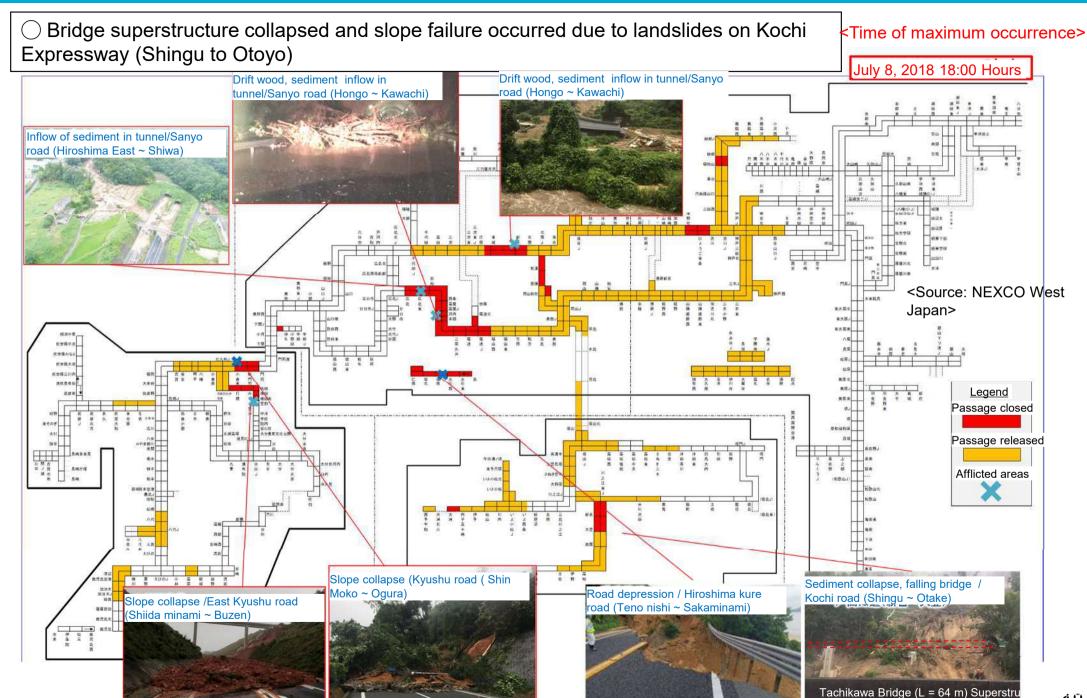


Oue to the heavy rains in July, 19 sections of up to 17 expressways, mainly in western Japan, suffered damage and were closed.



### Closed Sections of the Expressway and Damage Caused





#### Characteristics of the Disaster Caused by the Heavy Rains in July 2018



- O Due to the heavy rains in July 2018, up to 185 sections of the national routes were damaged and closed to traffic.
- O The damage was high in Hiroshima prefecture, Okayama prefecture, Gifu prefecture etc. where the total rainfall exceeded 500 mm.
- O Slope failure and sediment runoff occurred, and many roads were cut off. In addition, roads running side by side were flooded or scoured and destroyed by the flooding rivers.

(Total number of road closures due to the disaster: National routes under direct control: 81 sections, Subsidized national routes: Approx. 200 sections, Prefectural and municipal roads: Approx. 1,200 sections)

[Hiroshima Prefecture]
O Roads cut off due to sediment runoff



O Roads cut off due to debris flow



[Okayama Prefecture]
O Roads cut off due to flooding



O Roads damaged due to river flooding



[Gifu Prefecture]

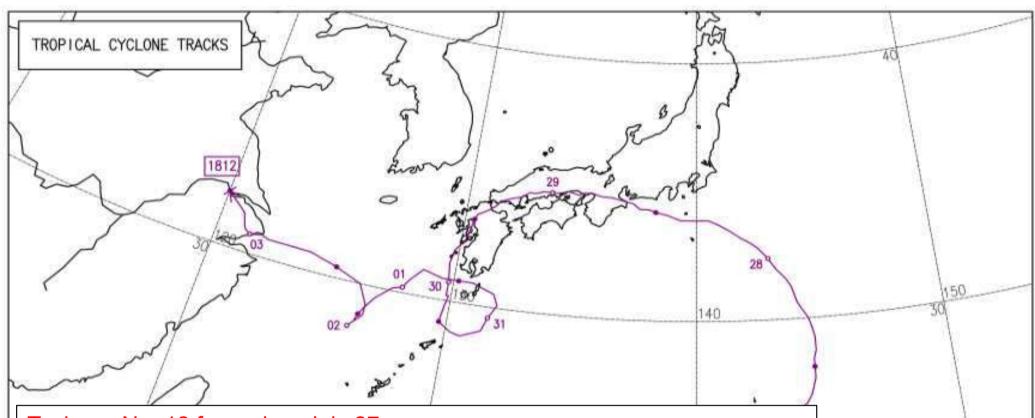
O Roads cut off due to sediment runoff



O Roads cut off due to slope collapse







#### Typhoon No. 12 formed on July 27

An unusual course taken by a "Reverse running typhoon" heading from east to west and west to south

- Taking a rare course, the typhoon approached and made landfall on the Japanese islands from east and went westward over Honshu
- A southward moving cold vortex creating counterclockwise winds caused the typhoon to move
- Fifteen vehicles submerged under high waves on the National Highway 135 running along the seaside in Odawara City, Kanagawa, and passenger cars were stranded
  - In Mie prefecture, road closures occurred due to damage caused by submerged roads,
- fallen trees etc.
- In Atami City, Shizuoka, window glasses in a hotel broke due to the high waves

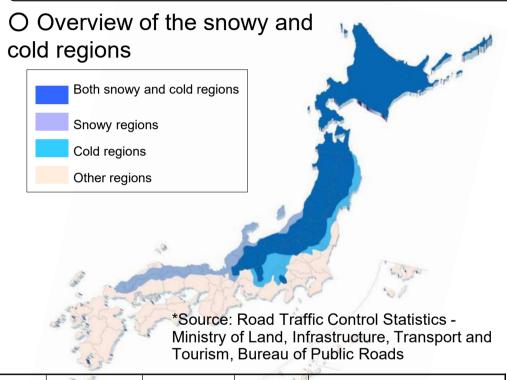
<Source: Japan Meteorological Agency>

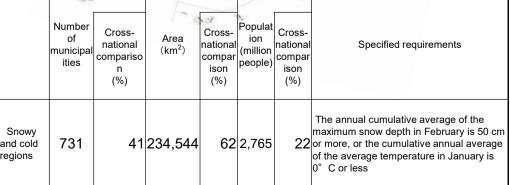
# Japan, Disaster-prone Country (Snow Damage)

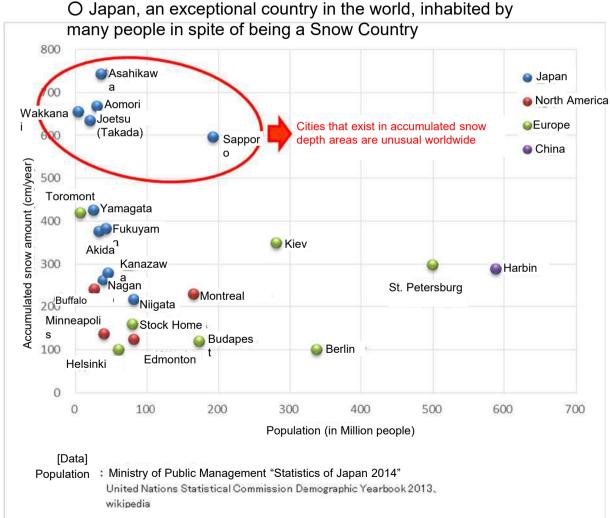


■ About 60% of the land area of Japan has snowy and cold regions

In recent years, localized torrential rainfall occurred at various places, and there was a record heavy snowfall in Kanto and Koshinetsu in FY 2005 (heavy snowfall of 2006) and FY 2013, and on the Pacific side, mainly in Niigata, as well as in Kyushu region in FY 2015.







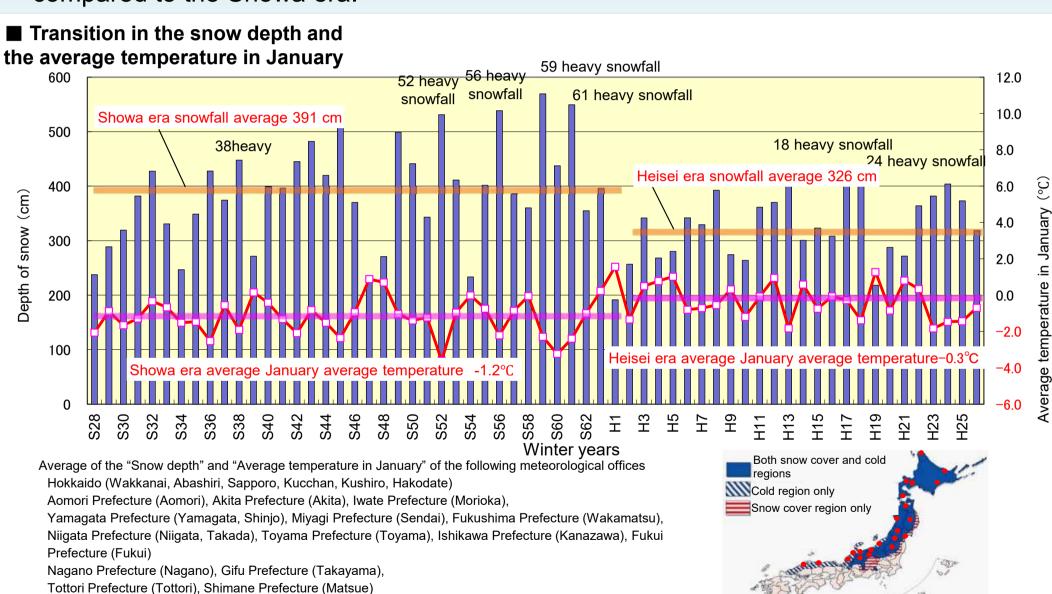
#### Situation of Snowfall in Recent Years ~ Intensive Snowfall in Short

#### Duration ~

Source: Meteorological statistical data (JMA)



- O The average snow depth is about 60 cm lesser in the Heisei era than in the Showa era.
- O The average temperature in January in the Heisei era is higher by about 1° C as compared to the Showa era.

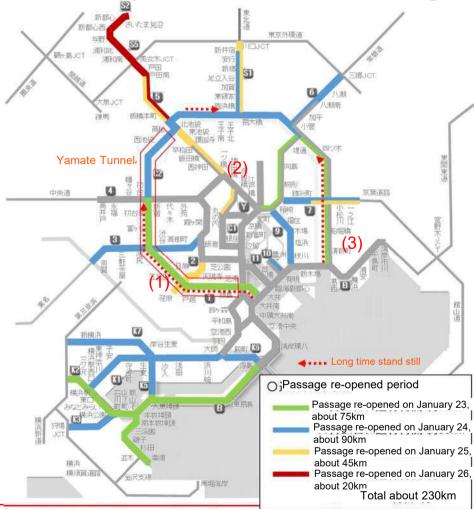


#### Snow in January 2018, Closures and Vehicle Congestion on the Metropolitan Expressways



Snow in January 2018, Closures and vehicle congestion on the Metropolitan Expressway

Snow in January 2018, Closures and vehicle congestion on the Metropolitan Expressway



Places where vehicle congestion lasted for long hours

(1) Central Circular Route (outer loop) Nishi Shinjuku JCT ~
Oi JCT

[Cause] A trailer was stranded [Maximum Length] Approximately 12 km [Duration of Traffic Congestion] Approximately 10 hours

- (2) Central Circular Route (Outer loop) Vicinity of the Oji Minami exit ~ Vicinity of the Takinogawa entrance [Cause] Two large vehicles were stranded [Maximum Length] Approximately 1.6km [Duration of Traffic Congestion] Approximately 11.5 hours
- (3) Central Circular Route (Inner loop) Yotsugi Exit ~ Kasai JCT [Cause] Congestion at the exit to a local road [Maximum Length] Approximately 10km [Duration of Traffic Congestion] Approximately 11 hours
- At the Metropolitan Expressway, the road closure started at 14:00 on January 22, and about 70% (approximately 230 km) out of the total length of 320 km was closed to traffic, and It took 4 days to fully resume the traffic.
- On the Central Circular Route, huge traffic congestion lasting for more than 10 hours occurred at three places

#### Heavy Snowfall from January 22 (Mon) to January 23 (Tue)



#### O Heavy snowfall from January 22 (Mon) to January 23 (Tue)



No. 3 Shibuya Route (inbound) Near Komazawa



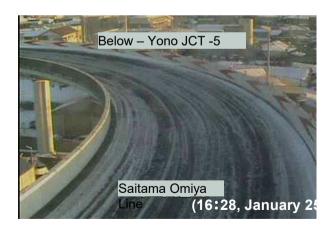
Central Circular Route (inner) Near Yotsugi Junction



No. 5 Ikebukuro Route (inbound)
Near Kumanocho curve



Central Circular Route (outer) Near
Oji Kita Junction



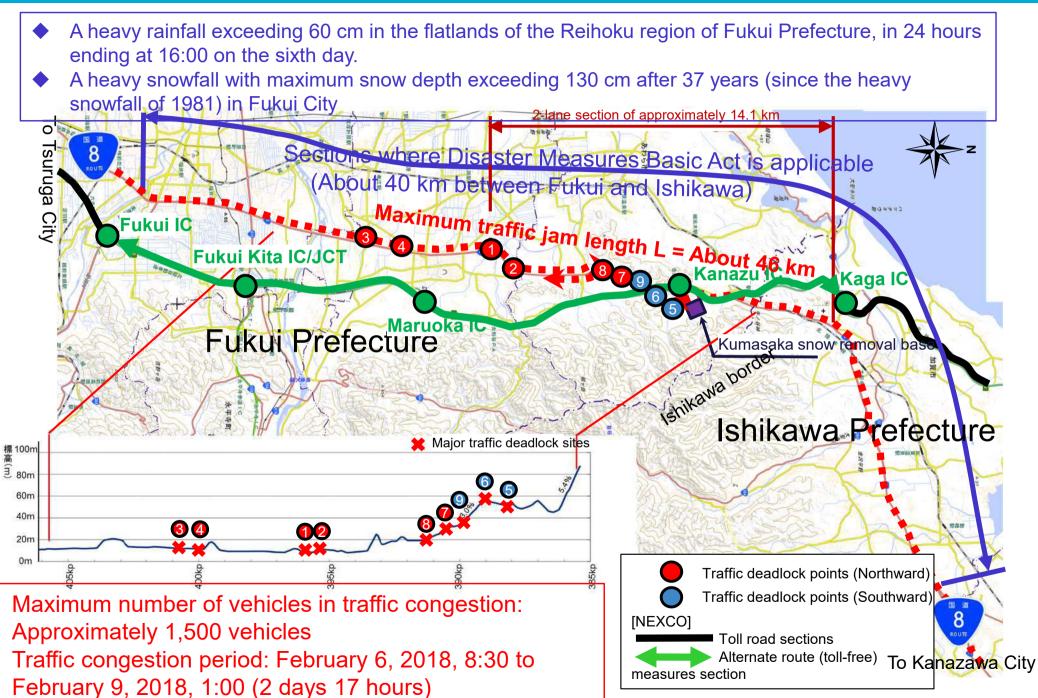
Saitama Omiya Route (outbound)
Near Yono JCT



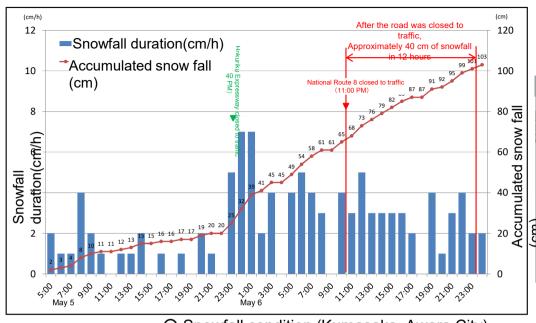
No. 1 Yokohane Route (inbound)
Near Hamakawasaki

# Snow in February 2018, Vehicle Congestion on Fukui and Ishikawa Prefectural Border National Route 8





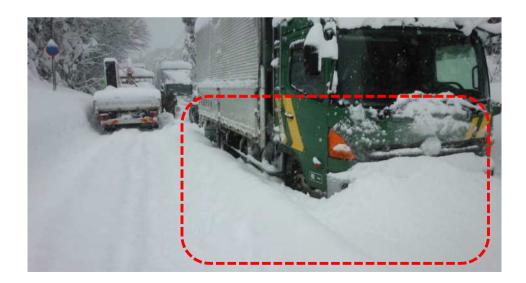




O Snowfall condition (Kumasaka, Awara City)



O Traffic deadlock situation







O Condition of snow accumulated between vehicles



# 2. Disaster Systems and Mechanisms

- 1). Basic Act on Disaster Control Measures
- 2. Disaster recovery projects



# 1 Basic Act on Disaster Control Measures

### **Objective**

O The objective is to contribute to ensuring the maintenance of social order and public welfare by protecting life, body and property of the citizens from a disaster.

### **Guiding Principle**

- O To always anticipate occurrence of disasters, minimize damage, and bring about quick recovery.
- O To ensure appropriate sharing of responsibilities and mutual cooperation among public institutions.
- O To promote voluntary disaster prevention activities undertaken by various entities.
- O Take measures to prepare for disasters in an integrated manner by appropriately combining them.
- O To bring about continuous improvement based on the scientific knowledge and lessons learned from past disasters.
- O To allocate the human resources, supplies, and other necessary resources appropriately, and protect human life and body with the highest priority.
- O To provide appropriate protection and support to disaster victims based on their circumstances.
- O To promptly restore facilities, support the victims and plan post-disaster reconstruction.

### Responsibilities of the State

- O The act was enforced with the mission to protect the nation, and the life, body and property of the citizens from disasters. The act imposes a responsibility on all organizations and functions to take all possible measures to prevent disasters.
- O To create and implement a plan that will constitute the basis for disaster management, disaster emergency response, and disaster recovery.
- O The act makes it mandatory to promote and comprehensively coordinate disaster prevention related administrative affairs implemented by local public bodies etc. and optimize the cost burden of a disaster.

#### **Responsibilities of Prefectures**

- O The state must create and implement a disaster prevention plan for a region in order to protect the region, and the life, body and property of the citizens from disasters, to aid in the implementation and comprehensive coordination of the administrative affairs for disaster prevention undertaken by municipalities and local public bodies.
- O There must be mutual cooperation among the central government, the municipalities and local public bodies such that they fulfill their responsibilities satisfactorily.

#### Responsibilities of Municipalities

- O The prefectures must create and implement a disaster prevention plan in order to protect a region, and the life, body and property of the citizens from disasters.
- O The prefectures must fully equip and prepare organizations such as the fire-fighting and flood-fighting organizations, promote voluntary disaster prevention activities by the citizens and strive to exercise all the functions fully.
- O There must be mutual cooperation among the prefectures, the fire-fighting and flood-fighting organizations, and other municipal agencies such that they fulfil their responsibilities satisfactorily.

#### Responsibilities of Residents

- O Persons responsible for disaster prevention must fulfil their responsibilities faithfully.
- O Those who are engaged on a regular basis in the supply and provision of goods, materials and services necessary for disaster emergency response and disaster recovery must continue to implement these business activities and strive to cooperate in the implementation of a disaster management policy by the state and public local bodies, even in the event of a disaster.
- O In addition to stockpiling of food, drinking water and other basic necessities and taking self-preparedness measures, the citizens must strive to contribute to disaster management by taking initiatives such as participating in disaster prevention drills and voluntary disaster management activities, and conveying the lessons learnt from the past to others.

#### Disaster Measures Basic Act



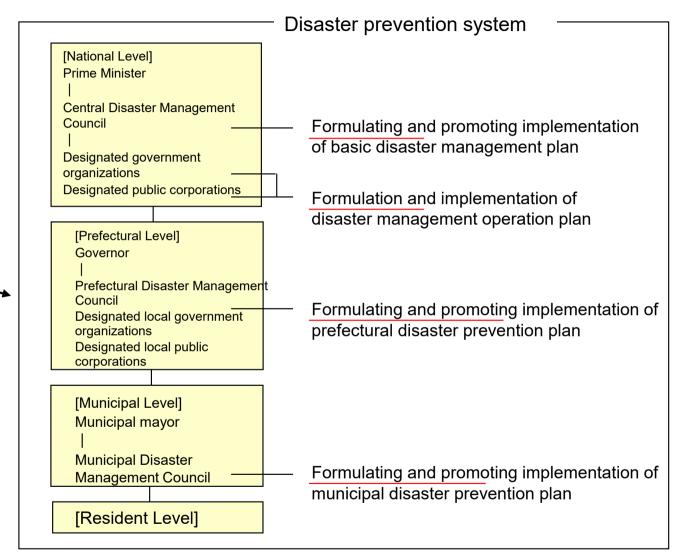
\* Main Contents

- 1. Clarification of the responsibilities for disaster prevention
- 2. Disaster prevention related systems
- 3. Disaster prevention planning
- 4. Promotion of disaster measures
- 5. Monetary and fiscal measures
- 6. State of disaster emergency
- \* Main Changes

Enacted in 1961, Ise wan typhoon damage (1959)

Revised in 1995, Great Hanshin-Awaji earthquake (1995).

Revised in 2013-2014, Great East Japan earthquake (2011)





4. Promotion of disaster measures: The responsibilities to be fulfilled and authorities of each executing entity according to the stages of disaster management, namely, prevention, emergency response and recovery, are defined

Disaster prevention → (Pre-disaster)

Preparing organizations for disaster management, Disaster countermeasures (hard measures)
Disaster prevention drills, stockpiling of supplies and materials for disaster management

Disaster emergency measures → (Immediately postdisaster) Disaster recovery →

(Post-disaster)

Issuance and transmission of warnings, issuance of evacuation advisory or orders, relief and rescue of victims, traffic regulation, etc.

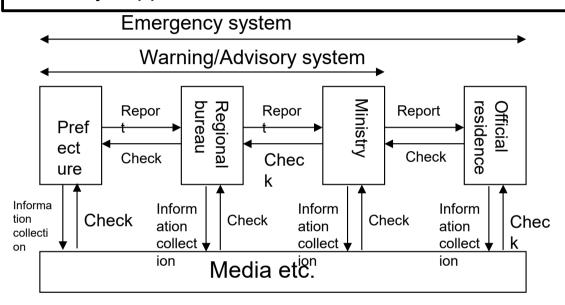
Individuals responsible for implementing disaster recovery Responsibility of the state concerning the operational expenses associated with disaster recovery

→ Prescribed in detail in the disaster prevention plan.

# Actions to be taken by the Ministry of Land, Infrastructure, Transport and Tourism in the event of a disaster



- Report the damage condition etc. to the official residence and ministers of the Ministry of Land, Infrastructure, Transport and Tourism, give instructions regarding a recovery policy, recovery support measures, etc.



#### Main reported items

Ministry of Land, Infrastructure, Transport and Tourism

- ☐ If there are any train derailment accidents, such as that of Shinkansen etc.
- ☐ Damage to roads, rivers, railways, airports, harbors, etc.
- ☐ Prospects of securing emergency routes and emergency recovery

#### Important information about roads

- ☐ Casualties due to road disasters, and isolation of communities
- ☐ Routes open to traffic, detours

# Disaster response during 2016 Kumamoto Earthquake

9:26 PM Ministry of Land Infrastructure and Transport Kumamoto Prefectural Disaster Management Headquarters were set up (Kumamoto Prefecture)  9:31 PM Response office was set up (Government)  9:36 PM Prime Minister's instructions  10:10 PM Major Disaster Management Headquarters were set up (Government)  11:00 PM 1st meeting of the Major Disaster Management Headquarters (MLIT)  1st meeting of the Major Disaster Management Headquarters (MLIT)  11:21 PM (Government)  May 15 1:00 AM 2nd meeting of the Major Disaster Management Headquarters (MLIT)  TEC-FORCE from the Kyushu Regional Bureau was dispatched to Mashikimachi  6:15 AM Disaster prevention helicopter Harukaze took off  2nd meeting of the Major Disaster Management Headquarters (Government)  4:07 PM 3st meeting of the Major Disaster Management Headquarters (Government)  5:00 PM 3rd meeting of the Major Disaster Management Headquarters (MLIT)  May 16 1:25 AM Earthquake (Seismic intensity 7) occurred  2:38 AM Prime Minister's instructions  4th meeting of the Major Disaster Management Headquarters (Government)  6:00 AM Disaster prevention helicopter Harukaze took off  7:00 AM 4th meeting of the Major Disaster Management Headquarters (MLIT)  11:30 AM (Government)  2:00 PM 5th meeting of the Major Disaster Management Headquarters (MLIT)  6:33 PM 6th meeting of the Major Disaster Management Headquarters (MLIT)  6:33 PM 6th meeting of the Major Disaster Management Headquarters (MLIT)	May	/ 14	9:26 PM	Earthquake (Seismic intensity 7) occurred
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			2:00 PM	
			6:33 PM	



# 2 Disaster recovery projects

# State Lability (Usually, Contribution Ratio is 2/3)



O In the event of a disaster, application for disaster recovery is made for the affected areas, based on which an assessment is made, and the cost of disaster recovery works is determined.

O In disaster recovery-related projects,

the proportion of the state liability is high starting from 2/3 (\*) of the cost burden.

\* The state bears 75% of the yearly disaster recovery cost if the cost is equivalent to the amount in the range starting from more than half the standard tax revenue to double the standard tax revenue.

The State bears 100% of the yearly disaster recovery cost if the cost exceeds double the standard tax revenues.

[State liability is 2/3, In the year of occurrence of a disaster]

State liability (National expenditure 66.7%)

Regional liability (Regional expenditure 33.3%)

Increased depending on Major disaster designation (Special financial aid for disaster recovery of public works facilities etc.)

State liability

(National expenditure 80% \* Over the past 5 years (2011 - 2015) Average expenditure increased from 70% → 84%)

Regional liability (20%)

For the regional expenditure, bonds (municipal bonds) can be issued

Bond issuance rate of municipal governments 100%

State liability (National expenditure 80%)

For 95% of the municipal bonds local tax grant is given (Local tax grant 19%)

State liability amount = National expenditure + Local tax grant = 99%

Substantial cost burden on local governments is 1% or less

~ Excerpt of the press release of April 26,

The earthquakes that have occurred since April 14, 2016 with epicenter in Kumamoto Prefecture etc. have caused a serious damage.

2016 by the Cabinet Office ~

Based on the "Act on Special Financial Support to Deal with the Designated Disaster of Extreme Severity", the concerned disaster was designated as a major disaster and with regard to the measures applicable to the concerned disaster, a cabinet decision has been taken to provide special financial support to local public bodies, such as raising the state subsidy for disaster recovery works, which is announced and enforced today (April 26 (Tue)).

# Disaster Recovery Works (Main Flow)



Occurrence of disaster

Comprehending damages
Emergency works

Survey and Planning

Procurement for emergency works

Commencement of emergency works\*

Technical support for emergency survey etc. of disaster

#### Disaster report

Meeting as necessary

Technical advice

Applying for state subsidy

(Confirmation of emergency works expenditure covered by the state subsidy)

\* Emergency works can start under the judgement of local public entities, even before disaster assessment.

Grant of state subsidy (Lumpsum amount for each prefecture)

Ministry of Land, Infrastructure, Transport

- Dispatch of TEC-FORCE members and experts
- ► Technical support

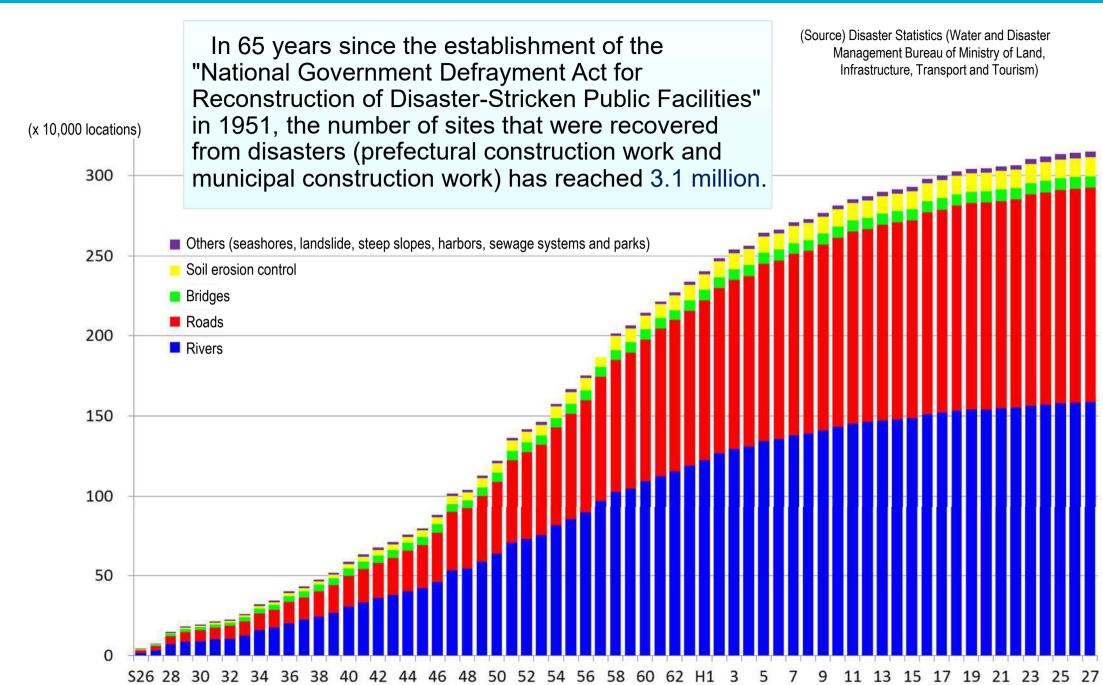
Disaster assessme nt

(Determination of emergency works expenditure covered by the state subsidy)

- Disaster recovery works
   Securing budget
- Determination of disaster recovery works expenditure

## Disaster Recovery Performance Records (Recoveries at Multiple Sites)





# Disaster restoration project (performance records)



#### Rivers

- Restored locations: Approx. 1.59 million locations.
- Extended length of restored stretches (rivers managed by prefectures): Approx. 85,000 km\*
- Equivalent to about three-quarter of approximately 110 km total stretch of rivers managed by prefectures.



#### Roads

- Restored locations: Approx. 1.34 million locations.
- ▶ Equivalent to about one location every 900 meters out of approximately 1.17 million km of roads managed by prefectures and municipalities.





#### Bridges

- Restored locations: Approx. 70,000 locations.
- Equivalent to about 10% of 650,000 bridges managed by prefectures and municipalities.





# Ports and harbors

- Restored locations: Approx. 70,000 locations.
- Equivalent to about 10 locations per port or harbor for 997 ports and harbors nationwide.





# Disaster restoration projects authority carried on behalf of managers (Kumamoto Earthquake)



O For Kumamoto Earthquake, particularly in Aso-Ohashi District where particularly significant damages were sustained, was subject to restoration of National Route 57, as well as implementation of countermeasures for fallen slopes on nationally managed roads, along with restoration of Aso Ohashi Bridge on National Route 325, together with restoration construction work implemented by the national government on behalf of prefectures and municipalities for their roads, including Tawarasan Tunnel, by applying the Restoration Law.

#### [Aso Ohashi District]

Fallen slope countermeasures (earth retaining constructions and slope countermeasures) & ordinary National Route 325 (Tateno, Minamiaso Village, Aso Country to Kawayo)



Since sophisticated technologies, such as construction work that involves the use of an unmanned equipment, are required, the national government conducted the erosion control on directly managed roads (slope countermeasures) as directly controlled project by substitute authority (ordinary National Route 325).

- Article 13 of the Road Traffic Law -
  - 3. The Minister of Land, Infrastructure, Transport and Tourism may, if sophisticated technologies are deemed necessary for the purpose of conducting construction work, where the use of sophisticated mechanical power for implementing such work is deemed appropriate or where affected areas are at the borders of prefectural sectors, conduct construction work relating to disaster restoration on National Routes that are outside the designated area for the national government, on behalf of prefectural governments. In such instances, the Minister of Land, Infrastructure, Transport and Tourism must notify relevant prefectures of such intent in advance.

[Prefectural road: Kumamoto-Takamori Line] (from Komori, Nishihara village in Aso County to Kain, Minamiaso Village)

[Village road: Tochinoki-Tateno Line] (Kawayo, Minamiaso Village, Aso County to Tateno)

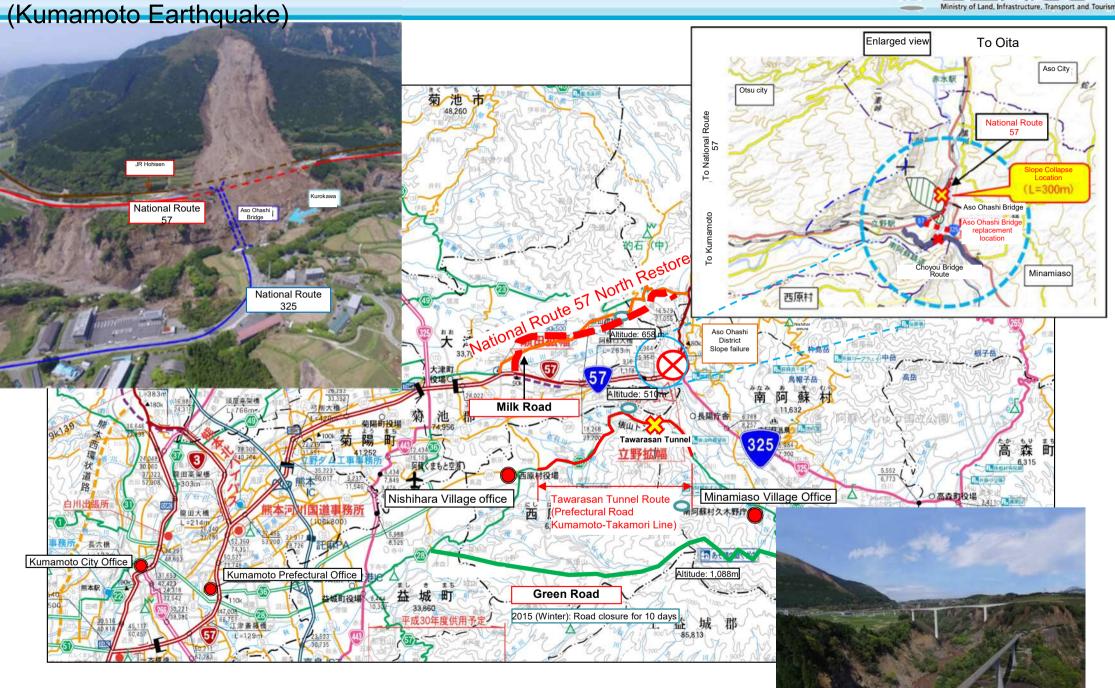


Both lines, on which serious damages have occurred, are dealt with by the national government to implement disaster restoration projects on behalf of the prefecture, based on the Large Scale Disaster Restoration Promotion Law, with considerations for actual situations at governments of Kumamoto Prefecture and Minamiaso Village.

- Law on Restoration from Large Scale Disasters Proclaimed on June 21, 2013
- 4. Implementation of construction work relating to disaster restoration projects on behalf of managers by national government and the like Disaster restoration projects for fishing ports, roads, sea coast maintenance facilities, rivers and the like may be performed by the national government on behalf of regional public organizations that sustained damages, based on request from such regional public organizations to provide supplementations.

Disaster restoration projects authority carried on behalf of managers







# 3. Road Disaster Response

## **Outline of TEC-FORCE (Technical Emergency Control Force)**



#### What is TEC-FORCE

TEC-FORCE (Technical Emergency Control FORCE): Task force dispatched to implement emergency disaster measures.

- O <u>TEC-FORCE was established in April 2008</u>, in preparation for large scale natural disasters to ensure rapid support can be provided to regional public organizations.
- O TEC-FORCE rapidly gains understanding on disaster status for which local governments need to respond to in the event of large scale natural disasters and provides technical support in a smooth and rapid manner for the purpose of preventing spread of disasters and for early recovery of disaster stricken areas and the like.
- O Personnel at each Regional Development Bureau, etc. throughout Japan (<u>17,887 personnel</u> have been appointed in advance as of April 2025) are mobilized under leadership of the Director-General of Headquarters for Disaster Control at the Ministry of Land, Infrastructure, Transport and Tourism.
- O TEC-FORCE plays a role in <u>"Trough Earthquake Disaster Prevention Promotion Basic Plan</u> (March 2014 Central Disaster Prevention Council)", "<u>The Metropolitan Earthquake Emergency Response Promotion Basic Plan (March 2015 Cabinet decision)</u>, etc."

#### Activity details

Disaster status surveys using helicopter for disaster management





[Severe rainfalls of Kanto and Tohoku Regions in September 2015] (Joso City in Ibaraki Prefecture)

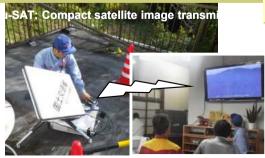
Dispatch of liaisons to municipalities



[Volcanic activity on Kuchinoerabushima Island in May 2015] [Yakushima Town in Kagoshima Prefecture]

[Severe rainfalls of Northern Kyushu in July 2017] (Toumine Village in Fukuoka Prefecture)

Securing monitoring system with Ku-SAT



[Eruption of Mount Ontakesan in September 2014] (Otaki Village in Nagano Prefecture)

Technical assistance to municipal governments



[Kumamoto Earthquake of April 2016] (Kumamoto Prefectural Office)

Emergency drainage with drainage pump truck



[Severe rainfalls of Kanto and Tohoku Regions in September 2015] (Kurihara City in Miyagi Prefecture)

Technical assistance for rescue operations



[Kumamoto Earthquake of April 2016] (Minamiaso Village in Kumamoto Prefecture)

## Outline of Technical Emergency Control Force (TEC-FORCE)



The objective is to carry out smooth and fast technical assistance as a country for disaster emergency measures carried out by local public entities in the affected areas, such as quick damage assessment, preventing occurrence and escalation of damage, quick recovery of affected areas and the like, in the event that a large-scale natural disaster occurs or is likely to occur.

- Pre-establishing a dispatch system of personnel and equipment, such as appointment of staff in advance as TEC-FORCE members, and implement fast activities
- Skill improvement by simulation and training during peacetime

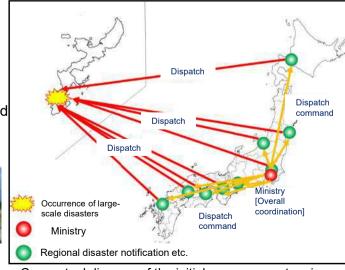
#### **Details of Activities**

- MLIT comprehensively coordinates the activities of the local branch office staff members throughout the country
- The state implements emergency survey independently
- Necessary emergency measures are implemented in collaboration with relevant organizations
  - Disaster Situation Survey:
    Helicopters for disaster
    countermeasures,
    telecommunication, survey
  - telecommunication, survey
  - Disaster risk prediction
  - Drafting a plan for measures
  - Thinking about enhancement and strengthening of technical level etc.
  - Emergency measures etc.





Drainage pump car



Conceptual diagram of the initial response system in the event of occurrence of an earthquake on the Okinawa main island

# Major Teams of TEC-FORCE and their Main Activities

(Teams)

Details of main activities

Advance team ... Grasping the situation of the affected areas.

Reporting to the disaster management headquarters regarding support scale.

Telecommunications team · · · · Securing communication lines.

Video streaming etc. of disaster situation.

High- tech support team ... Specific disaster situation survey

Technical support for recovery policy etc.

Disaster situation survey team ... Helicopter survey.

Field survey (roads, dams, ports, buildings, etc.)

Emergency response team ····· Emergency drainage by drainage pump cars.

Clearing roads/routes of obstacles etc.

Public relations team · · · · · · · Shooting photos and videos for publicity.

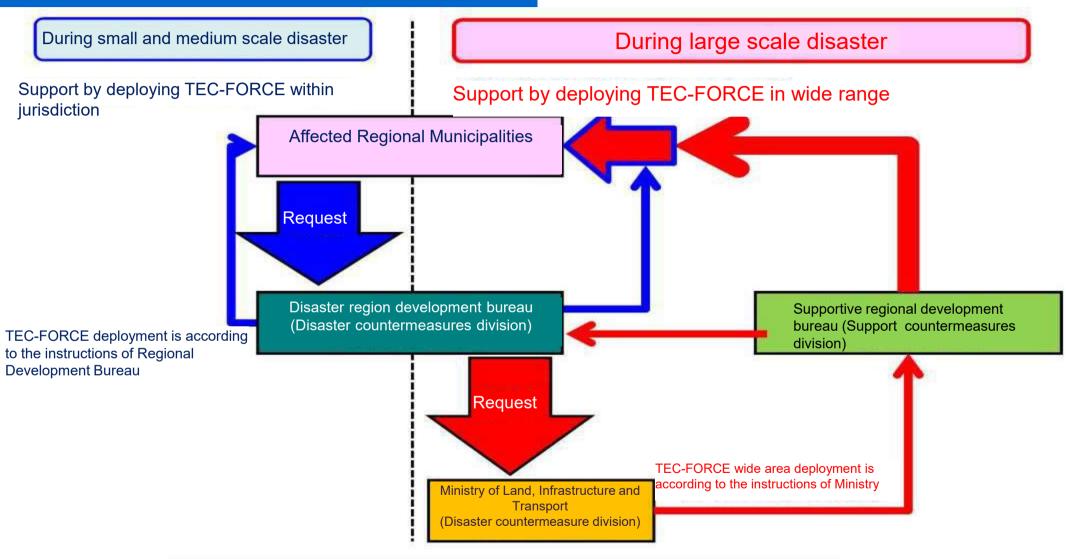
Preparing an outline of activities

Logistics team · · · · · · · Arranging for transportation and accommodation facilities.

Preparing working environment etc.



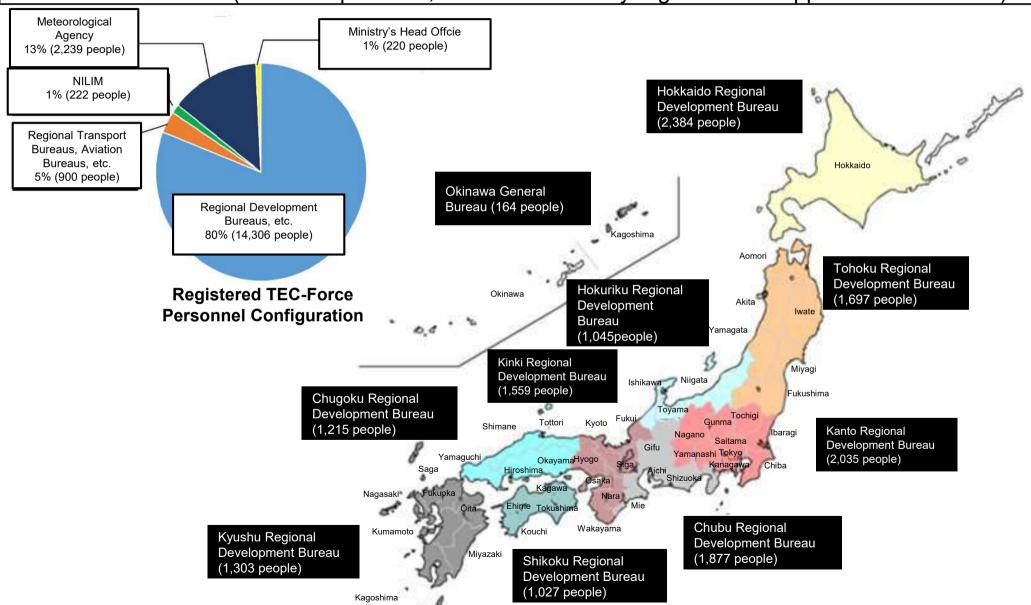
# Support mechanism in accordance with disaster scale



# Number of TEC-FORCE Personnel



■ There are 17,887 personnel, many of them work for the Regional Development Bureaus, are appointed; they will be dispatched from around the nation to disaster striken areas depending on the scale of a disaster. (※ as of April 2025; summed from only organizations appointed in advance)

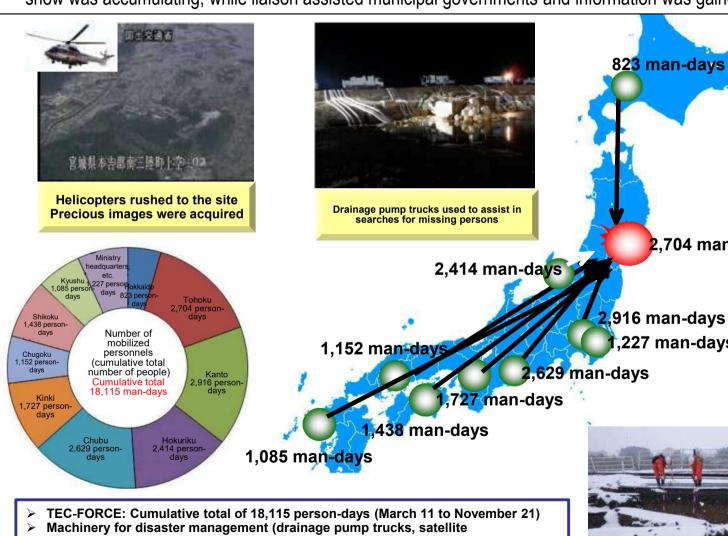


## Responsive Actions Taken When Earthquake Struck:

Assistant Status for Great East Japan Earthquake



- O The Minister of Land, Infrastructure, Transport and Tourism issued orders to dispatch approximately 400 TEC-FORCE personnel from Regional Development Bureaus from various regions by the following day of earthquake disaster striking when Great East Japan Earthquake occurred in March 2011.
- O Personnels that exceeded 500 number at peak were mobilized to drain water using drainage pump trucks while aftershocks continues and snow was accumulating, while liaison assisted municipal governments and information was gained on the disaster status of roads and levees.





Personnels became the right-hand man, so to speak, for mayors of municipalities Staff members were dispatched to provide technical



Satellite communications vehicle used to secure disrupted communication lines

communication vehicles, etc.): Cumulative total of 5,760 vehicle-days dispatched within a month since disaster occurred.



,227 man-days

2,704 man-days

823 man-days



Gaining understanding on road disaster status

## Responsive Actions Taken When Severe Rainfall Struck: Assistance Status

for Hiroshima Landslide Disaster



#### Liaisons dispatched to collect and provide information, as well as liaise coordinated efforts

- Liaisons dispatched to Hiroshima Prefecture, Hiroshima City, Asakitaku Ward Office, Field Management Headquarters of the Government, Field Search Headquarters of Hagi District, starting from the day on which the disaster struck.
  - Collection of information on evacuation status, disaster status, etc.
  - Provision of information on status of disaster repose by Regional Development Bureau
     Liaison of coordinated effort with search activities

Achieving rapid and accurate assistance!







Field Management Headquarters of the Government, Hiroshima Prefecture

Field Search Headquarters of Hagi District

#### Multi-area dispatch of TEC-Force

- Total manpower of 2,431 person-days were dispatched from Hokuriku, Chubu, Kinki, Chugoku, Shikoku and Kyushu Regional Development Bureaus, as well as the National Institute for Land and Infrastructure Management and Public Works Research Center, as members of the TEC-FORCE.
  - Day on which disaster struck (August 20): Shikoku and Kyushu Regional Development Bureaus and National Institute for Land and Infrastructure Management
  - Following day (August 21): Hokuriku and Chubu Regional Development Bureaus (Public Works Research Center dispatched on 22nd and Kinki Regional Development Bureau dispatched on 28th, following completion of their intra-governmental dispatch duties.
- Kinki Regional Development Bureau (Disaster Management Headquarters Vehicle) and Kyushu Regional Development Bureau (Sidewalk cleaning vehicle) also dispatched disaster management vehicles.



Surveys performed by disaster management helicopters



Disaster Status Surveys by TEC-FORCE



Disaster survey findings reported to Mayor of Hiroshima City



Advice given for search and rescue operations by TEC-FORCE4/

## Substituting in to perform damage status surveys (Kumamoto Earthquake)



- Damage status survey was performed in a rapid manner, on behalf of local municipal governments based on information pertaining to damage status and needs for assistance collected by the liaison. Contribution was made to shorten the time required for serious disaster area designations, by utilizing aerial photographs for interpretation.
  - for a designation to be authorized with Niigata-Chuetsu Earthquake  $\rightarrow$  9 days this time (cabinet decision reached on April 25)
  - \* An area is designated as a serious disaster area when the estimated amount assessed for damages exceed the standard level, based on a survey conducted to determine disaster status on such matters as public civil engineering facilities and the like.
  - \* The rate of national subsidy for recovery of public civil engineering facilities and agricultural land is raised and the subsidy for small to medium size businesses is applied when an area is designated a serious disaster area.
- O In addition to reporting on survey results, explanations and advice are provided in a clear manner to make a contribution towards subsequent rapid disaster recovery.

## Gaining understanding on current disaster status and assistance needs



■ Mayor of Aso City



■ Mayor of Minamiaso Village

Substituting in to perform damage status surveys on local municipal government facilities



■ Mashiki Town



■ Aso City

# Reports and advice on disaster status



■ Kumamoto City



■ Nishihara Village

<sup>\*</sup> Damage status surveys on 17 rivers managed by Kumamoto Prefecture (total span of 107.6 km) were conducted and survey results were reported to the Governor of Kumamoto Prefecture as well as others.

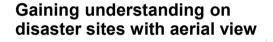
<sup>\*</sup> Damage status surveys were conducted at 13 municipalities in relation to roads and the like managed by those municipalities and survey results were reported to the heads of municipalities.

# Inspection of sites with risk of landslide disasters

(Kumamoto Earthquake)



- In order to avoid occurrence of secondary disasters associated with aftershocks and rainfalls, sites with high risk of landslides identified with high urgency at 1,155 locations were inspected within nine days and findings were reported to the Governor of Kumamoto Prefecture, as well as heads of 13 municipalities.
  - Results from inspecting sites with risk of landslide disaster: Risk Level A at 54 locations, Risk Level B at 77 locations and Risk Level C at 1,024 locations.
- Disaster status surveys were conducted at sites with denuded land and cracks, such as Mount Yomine, Tarutamagawa River, Mount Gairin and the like, in response to requests received from Aso City and Minamiaso Village, which were concerned about landslide disasters due to cracks associated with earthquake. Survey reports were provided, along with technical advice regarding continuous monitoring of areas destroyed by landslides.







Inspection of sites with risk of landslide disasters





Reports and advice on inspection results



**■** Governor of Kumamoto Prefecture



# Securing access for emergency vehicles (Kumamoto Earthquake)



- O <u>Obstacles were rapidly cleared from prefectural and municipal roads</u>, which had become inaccessible due to subsidence or landslide damage.
- O <u>An alternate route was secured for National Route 57</u>, which had become inaccessible due to major landslide disasters and had to be made accessible for aid to disaster stricken communities.
  - Obstacles on National Route 443 were cleared (April 20) to secure access to central Mashiki Town, which had been inaccessible.
  - Routes bound to direction of Aso, which serve as alternate routes for National Route 57 that had become inaccessible due to major landslides were secured by clearing obstacles off the Milk Road (April 22) and Green Road Minamiaso (April 22).

A route for the direction of Aso was secured to serve as an alternate route for National Route 57, which became inaccessible.





■ National Route 443 (Mashiki Town)



■ Green Road Minamiaso

**Emergency restoration (clearing roads of obstacles)** 



■ National Route 443 (Mashiki Town)



■ Green Road Minamiaso

Securing access for emergency vehicles



■ Securing access for emergency vehicles (Mashiki Town)



Securing east to west link in directions to Kumamoto and Minamiaso

# Deployment status of equipment for disaster management at Ministry of Land, Infrastructure, Transport and Tourism



#### Equipment from all over Japan are gathered to provide support when a major disaster strikes

▼ As of April 1, 2024 (Unit: Vehicles)

Ground leveler	Drainage pump truck	Illumination vehicle	Management headquarters vehicle Standby assistance vehicle	Remote control backhoe	Remote control equipment (RoboQ)	Satellite communicatio ns vehicle	Car-SAT	Ku-SAT	Disaster management helicopter	Remarks
Hokkaido	38	21	8	1	3	4	1	14	1	
Tohoku	59	39	10	2	1	4	1	19	1	
Kanto	44	41	25	2	1	9	1	29	1	
Hokuriku	51	49	9	3	0	4	1	20	1	
Chubu	37	34	15	2	1	6	1	17	1	
Kinki	43	28	17	1	1	7	1	21	1	
Chugoku	35	24	6	1	2	5	1	16	1	
Shikoku	35	28	11	2	1	5	1	8	1	
Kyushu	62	24	9	2	9	4	1	16	1	
Okinawa	1	3	1	0	0	1	1	6	0	
Total	405	291	111	16	19	49	10	166	9	



[Severe rainfalls of Kanto and Tohoku Regions in September 2015] (Joso City in Ibaraki Prefecture)



[Kumamoto Earthquake in April 2016]
(Mashiki Town in Kumamoto Prefecture)

# ■ Management headquarters vehicle



[Hiroshima Landslide Disaster in August 2014] (Hiroshima City in Hiroshima Prefecture)

#### ■ Satellite communications vehicle



[Kumamoto Earthquake in April 2016] (Minamiaso Village in Kumamoto Prefecture)

### ■ Ku-SAT (compact satellite image transmitter)



[Volcanic eruption on Kuchinoerabushima Island in May 2015] (Kuchinoerabushima Island in Kagoshima Prefecture)

#### Other equipment

Sandbag making machines, portable emergency bridges, road sprinklers, bridge inspection vehicles, gutter cleaning vehicles, road sweepers, etc.

# Status of Communication Network at Ministry of Land, Infrastructure, Transport and Tourism

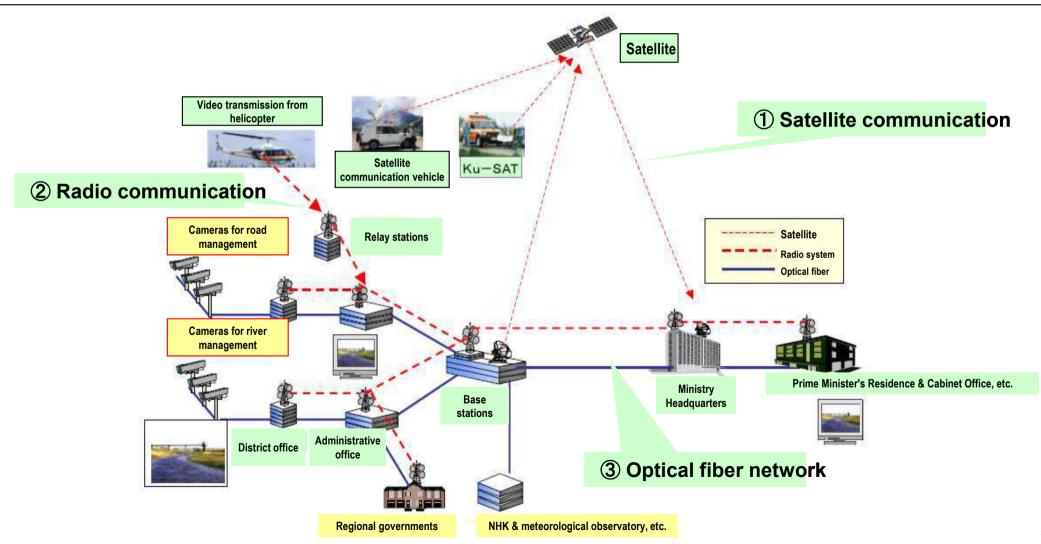


Information gained on site is transmitted to the headquarters at the Ministry of Land, Infrastructure, Transport and Tourism primarily by using following methods:

① Images captured by portable cameras are transmitted by <u>satellite communication</u> via a satellite communication vehicle or compact image transmitter.

(transmitted to relevant organizations via radio communication from base stations)

- ② Images captured by helicopters are transmitted to relevant organizations by <u>radio communication</u>, via radio relay stations.
- ③ Images captured by fixed surveillance cameras are transmitted by taking advantage of optical fiber network with a total nationwide span of 33,000 km.





# 4. Road Disaster Prevention Measures

- 1. Earthquakes
- 2. Severe Rainfalls
- 3. Snow and Cold

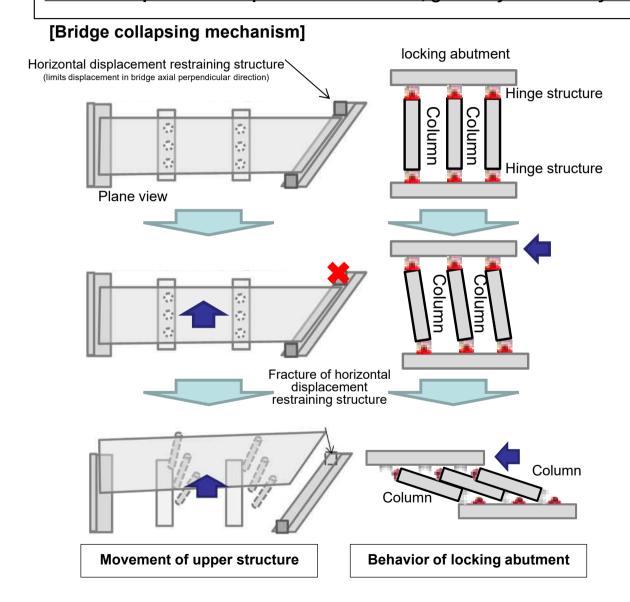


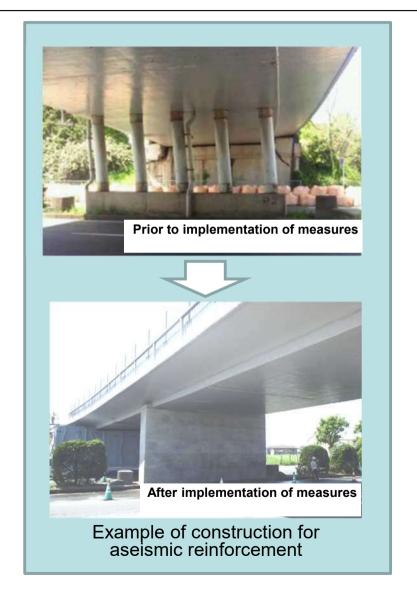
# 1 Earthquakes

# Aseismic reinforcement of locking abutment



Aseismic reinforcements were implemented to locking abutments of expressways, national routes under direct control, as well as overpasses that span over such roads, generally in about 3 years (approximately 450 bridges) completed in 2021





# Earthquake resistance of overpasses



For overpass bridges that cross expressways and directly controlled national roads, at least measures to prevent bridges from falling or collapsing were completed in FY2021.

\* Countermeasures have already been implemented for expressways and directly managed national roads.

<b>Expressway</b>	100%		
Directly managed road	100%		
Regionally managed road	100%		
Total	100% (approx. 8,800 bridges)		
_	Countermeasures already implemented		

Overpasses that span over expressways and directly managed national roads Implementation status of countermeasures for prevention of bridge collapses by falling or tilting over.









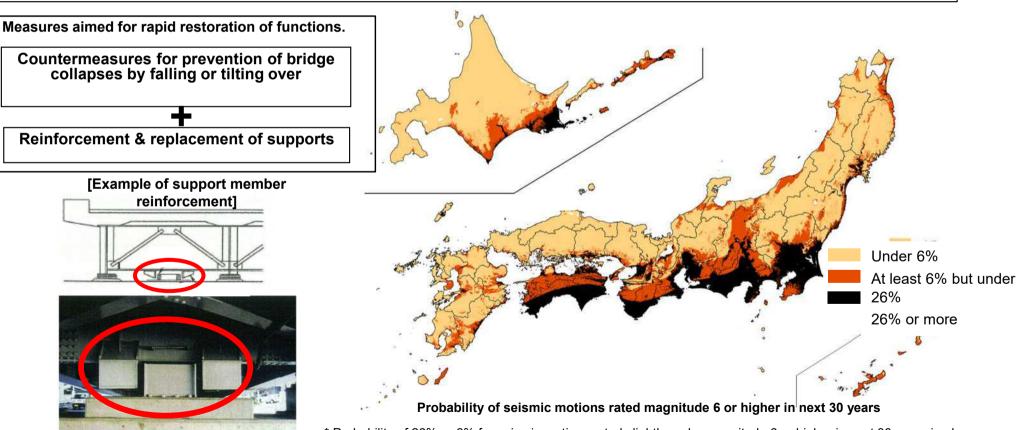




In consideration for the probability of large scale earthquakes occurring, countermeasures\*1 involving reinforcements and replacements of supports for expressways and directly managed national routes were accelerated in order to ensure that no major differences in levels occur on road surfaces.

- For time being in 5 years: Completed in regions with probability of at least 26%\*2.
- In the future in 10 years: Aim for completion of aseismic reinforcement throughout Japan.
  - \*1: Aim to rapidly restore functions of bridges by reinforcing support members and the like.

    Other measures will be implemented if reinforcement of support members is not possible.
  - \*2: Implementation of countermeasures promoted also for regionally managed roads that are used for emergency transport.



Structure for distributing horizontal force

\* Probability of 26% or 6% for seismic motions rated slightly under magnitude 6 or higher in next 30 years imply that there will be seismic motions of slightly under magnitude 6 or higher will occur once in about 100 years or about 500 years.

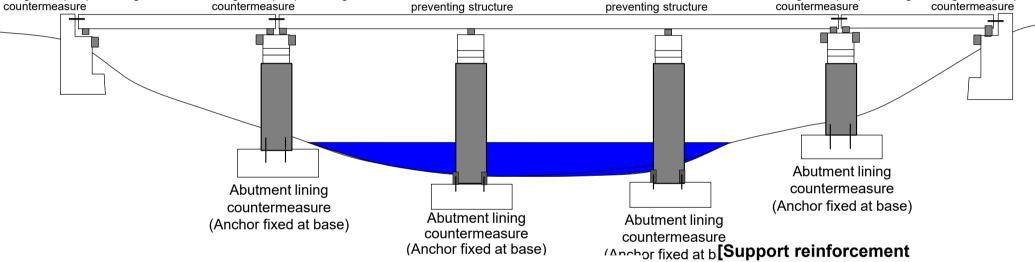
# Earthquake countermeasures (aseismic reinforcement of bridges)



The extent of damages sustained was slight and functions of bridges could be rapidly restored to fulfill the required performance level even though the intensity of the earthquake was of the same level as that of Southern Hyogo Prefecture Earthquake, and as such, abutments were lined, countermeasures were implemented to prevent bridge falling and support reinforcements were installed.

#### **Countermeasure examples**

- · Support reinforcement
- Installation of level difference preventing structure
- Bridge collapse preventing countermeasure
- Support reinforcement
- Installation of level difference preventing structure
- Bridge collapse preventing countermeasure
- Support reinforcement
- Installation of level difference preventing structure
- Support reinforcement
- Installation of level difference preventing structure
- · Support reinforcement
- Installation of level difference Installation of level difference preventing structure
- Bridge collapse preventing countermeasure
- Support reinforcement preventing structure
  - Bridge collapse preventing countermeasure



#### [Bridge collapse preventing structure]



#### [Edge extension]



# (displacement limiting structure)]



## Earthquake countermeasures (aseismic reinforcement of bridges)



- Aseismic reinforcement countermeasures were implemented, based on experience of damages sustained by bridges from Southern Hyogo Prefecture Earthquake.
- No damages were sustained by bridges that had aseismic reinforcements (steel plate lining reinforcement) implemented from Great East Japan Earthquake.







Status of bridges after implementation of countermeasures

#### Disaster status following Southern Hyogo Prefecture Earthquake

#### Actions taken to implement aseismic countermeasures (since Southern Hyogo Prefecture Earthquake)

O May 1995: Restoration specifications

- Specifications pertaining to aseismic countermeasures for newly constructed bridges as well as existing bridges as provisions for foreseeable future, with the occasion of Southern Hyogo Prefecture Earthquake taken as an opportunity for improvement.
- O November 1996: Specifications for Highway Bridges
- Review of aseismic countermeasures implemented on the occasion of Southern Hyogo Prefecture Earthquake (standardization of restoration specifications)
  - ⇒ Review of design ground motions, increase of abutment bearing capacity and implementation of aseismic design, etc.
- O December 2001: Specifications for Highway Bridges
- Matters relating to aseismic countermeasures basically follow contents from the Specifications for Highway Bridges of 1996
  (Major changes: Aseismic performance that must be secured for bridges according to the level of design ground motions and importance of bridges was clarified).
- O February 2012: Specifications for Highway Bridges
- Matters relating to aseismic countermeasures basically follow contents from the Specifications for Highway Bridges of 1996 (Major changes: Partial review on design ground motions on the occasion of Great East Japan Earthquake).
- July 2017 Specifications for Highway Bridges
- Matters relating to aseismic countermeasures basically follow contents from the Specifications for Highway Bridges of 1996 (Major changes: responses based upon the damage caused by the Kumamoto earthquake)

### Earthquake Countermeasures

(Various Plans Relating to Great Nankai Trough Earthquakes and Inland Epicentral Type Earthquake at Metropolis of Tokyo)



Statutory plans Plans prepared to promote implementation of statutory plans Note: This table excludes matters relating to restoration and reconstruction. Preparation for restoration and **Preparation for emergency Basis laws Preventive measures** Responsive actions for disasters reconstruction measures Basic Act on Disaster Basic Disaster Prevention Plan [Decided by Central Disaster Prevention Cour Management Article 34 Act on Special Measures Concerning Advancement of Basic Disaster Prevention Plan for Tonakai and Nankai Earthquakes [Decided by Central Disaster Prevention Council (March 2004)] Countermeasures Against Disasters of Tonankai and Nankai Earthquakes (July 2002) Specific plan (March 2007) Transition Basic Plan for Promotion of Nankai Trough Earthquake Disaster Prevention Measures Act on Special Matters pertaining to basic policies and basic programs, as well as specific targets of such programs, along with Measures the dates by which such targets are to be achieved and basic policies pertaining to implementation of disaster emergency Concerning countermeasures when an incident occurs Advancement of Countermeasures **Against Disasters Specific** of Nankai Trough Earthquakes Revised March 30, 2015 (November 2013) Inland Epicentral Basic Plan for Promotion of Emergency Countermeasures for Inland Epicentral Type Earthquake at Metropolis of Tokyo [Cabinet Type Basic matters pertaining to programs for inland epicentral type earthquake at Metropolis of Tokyo, including sustaining capital central functions Earthquake at Metropolis of Specific plan Tokyo Special Decided on March 29, 2016 Measures law (November 2013) Government Duties Continuation Plan (Countermeasures for Inland Epicentral Type Earthquake at Metropolis of Tokyo) [Cabinet Decision]

#### Earthquake disaster countermeasures:

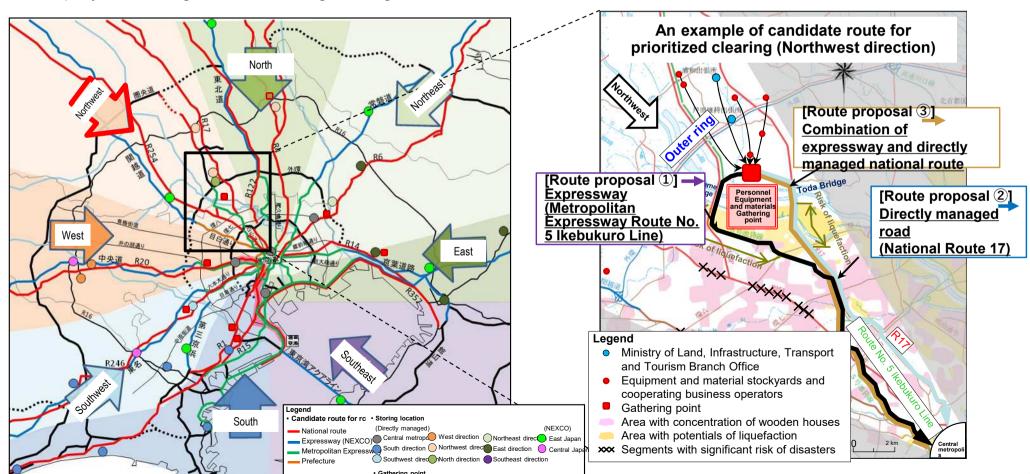
Formulation of Road Obstacles Clearing Plan for Inland Epicentral Type Earthquake at Metropolis of Tokyo



- The "Project for Enlightenment of Earthquake Roads Directly Under the Tokyo Metropolitan Area" was formulated.
- Through regular drills, etc., issues in each process were identified, verified, and improved, and plans were improved.

# [Outline of "Road Obstacles Clearing Plan for Inland Epicentral Type Earthquake at Metropolis of Tokyo" (the eight directions strategy)]

- Multiple disaster patterns are presumed to set candidate routes for prioritized clearing in each of eight directions.
- Operational units and assembly points for equipment and materials are established for each direction. A framework for rapidly assembling and commencing clearing work after a disaster strikes is established.

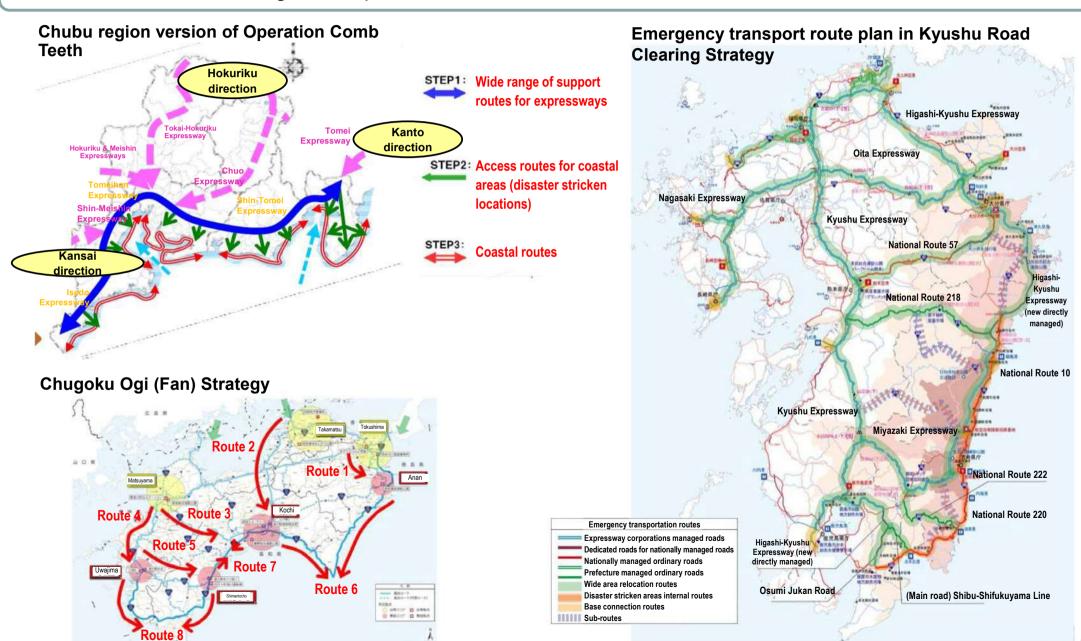


## Earthquake disaster countermeasures:

Road clearing plan for presumed Nankai Trough Earthquake



■ The Road clearing Plan (Proposal) was formulated in Chubu, Kinki, Shikoku and Kyushu regions as responsive measure for Nankai Trough Earthquake



# Road clearing training: Debris and vehicle removal and temporary bridge installation training



Respective organizations cooperated with each other to implement practical training for removal of presumed removal of bridges and vehicles washed out by tsunami (93 people participated)

■ Date & Time: November 29, 2015 (Sunday) from 9:00

■ Location: Wakano, Hidakagawa Town, Hidaka County, Wakayama Prefecture (on riverbed of Hidakagawa River)

■ **Sponsor**: Wakayama Prefecture

■ Participating 3rd Division of Japan Ground Self-Defense Force (9 people), Kinki Regional Development Bureau (11 organizations: people) and Wakayama Prefecture (12 people)

Hidaka Construction Industry Cooperative Society (42 people) and Kinan Construction Industry

Cooperative Society (19 people)

Outline of training: Bridges washed out by tsunami triggered by Nankai Trough Earthquake

 Removal of vehicles (Kinki Regional Development Bureau) and removal of debris (Wakayama Prefecture)

Restoration of washed out bride (Japan Ground Self-Defense Force and Kinki Regional Development

Bureau)

#### ○ Training, removal of vehicles



O Removal of debris



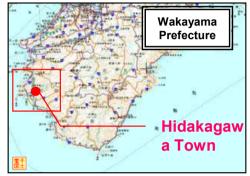


Restoration of bridges with culvert drain pipes









 Restoration of bridges using self-propelled bridges





# Earthquake disaster countermeasures: Installation of

#### evacuation stairs



- O Taking into consideration the lessons learned from the experience of the Great East Japan Earthquake, agreements were concluded with local governments in regions where tsunami is anticipated so that embankments can be utilized as temporary evacuation sites, by installing evacuation stairs and organizing evacuation space, etc.
- O Evacuation stairs and the like will continue to be organized, while such activities are <u>incorporated into</u> <u>regional disaster prevention plans, evacuation guide signage system is organized and utilization training is conducted with local residents</u>, to enhance disaster prevention functions.

#### <National status on organization of evacuation stairs>

Road type	Expressway Business managed	Nationally managed	Local government managed	
Number of installation locations	2 6	1 4 8	7 7	

<sup>\*</sup> Current as of March 31, 2015 (local government management current as of March 31, 2014)

#### <Evacuation guidance signage system (JIS Z 9097)>







#### **Example of organized evacuation stairs>**

(National Route 38 New Kushiro Line)





# 2 Severe Rainfalls

# Severe rainfall countermeasures: Status on sectors where traffic is

regulated in advance



 Advance traffic regulated sectors are established according to the amount of rainfall, particularly at locations where there are potentials for disasters, to secure safety of road traffic.

#### O Sectors with traffic regulated in advance according to amount of rainfall

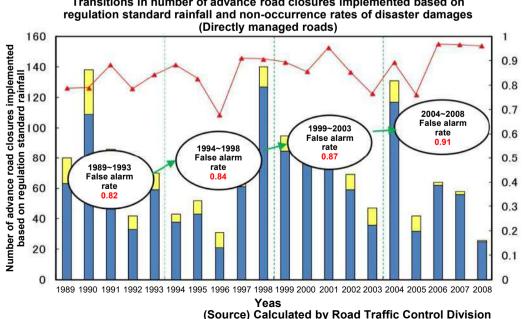
Advance traffic regulated sectors are sectors where traffic is stopped when the amount of continuous rainfall reaches a specific amount of standard rainfall or more when such meteorological anomalies as severe rainfall occurs.

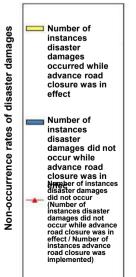
	Actual extended length	Number of regulated sectors	Extended length of regulated	
	(km)	(sectors)	sectors (km)	
Directly managed road	Approx. 24,000	209	Approx. 1,300	
Prefecture managed national	Approx. 32,000	781	Approx. 5,500	
routes	Approx. 32,000	701		
Total	Approx. 56,000	990	Approx. 6,800	

O Status on sectors of directly managed national routes where traffic is regulated in advance

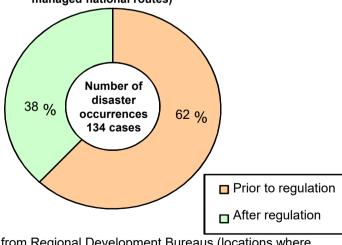
Transitions in number of advance road closures implemented based on

Note: Actual extended lengths, number of regulated sectors, extended length of regulated sectors are current as of March 31, 2013.





Disaster occurring times for advance traffic regulated sectors (directly managed national routes)



(Source) Data from Regional Development Bureaus (locations where disaster damage restoration work was performed from 1997 to 2008)

<sup>\*\*</sup> Of locations where incidents occurred among advance traffic regulation sectors, those for which disaster occurrence time has been determined were selected.

# Severe rainfall countermeasures:

#### Background history of road disaster prevention general inspection



- O Disaster prevention measures implemented, primarily at locations where countermeasures were required, among sectors where traffic is regulated in advance.
- The disaster prevention records inspection is conducted at locations where countermeasures or disaster prevention records are required (conducted annually with directly managed routes).

#### **Disaster prevention measures projects**



Grating crib work + anchor work



Grating crib work



Pocket type rockfall prevention net work



Wire rope application work



Falling rock protective fence work Falling rock prevention cover work (rock shed)



Inspection on rolling stone



Inspection on unstable rock masses

# 

Inspection results are managed on records



Inspection on works of already implemented countermeasures

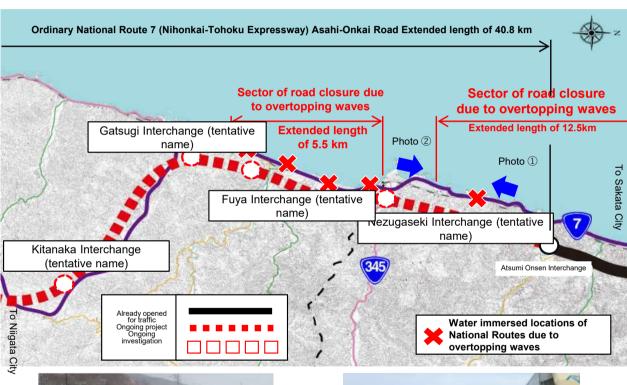
# Severe rainfall countermeasures: Road network for securing

#### alternate routes



O Improvements on high standard arterial roads are promoted in sectors where there are potentials for impact on traffic over a broad area during abnormal meteorological events.

■ Alternate routes when disasters occur are secured by improving high standard arterial roads







① Objects washed ashore by overtopping waves
(Wasada in Tsuruoka City: April 4, 2012)



 Traffic congestion status due to traffic regulation
 (Nezugaseki in Tsuruoka City: April 4, 2012)

High standard arterial roads are organized at locations away from sea coastline to secure alternative routes when disasters strike from overtopping waves.

# Severe rainfall countermeasures: Utilization of hazard maps



Maps that indicate locations where there are risks of flooding on roads from severe rainfalls are produced and published, while countermeasures to secure road traffic are considered.

# O Case example of road flooding information provision activities

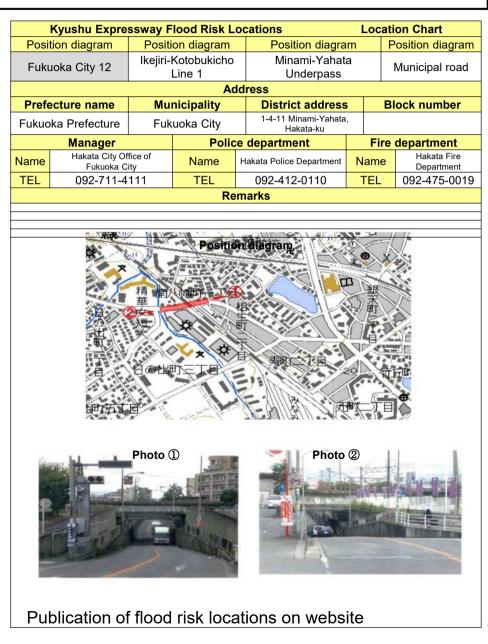
Hardware countermeasures: Provision of information via road information boards

Software countermeasures: Preparation and publication of flood danger location maps

(information shared among relevant organizations and coordination enhanced with initial system)



Provision of information via road information boards





#### <u>Prevention of recurring flooding of vehicles at underpass sections</u> from severe localized rain

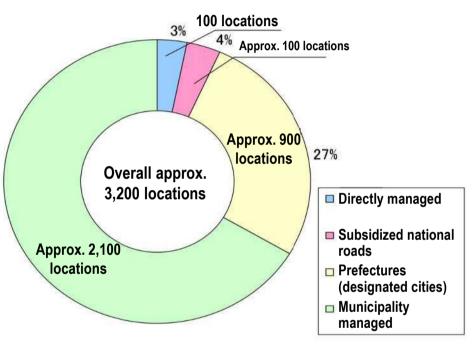
#### $\square$ Underpass section (carriageway only)

- Approx. 3,200 locations exist nationally.
- Among these, 100 locations exist among directly managed national routes.

#### □ Basic Policy

- Implementation of hardware countermeasures such as drainage pumps, information boards and monitoring cameras, with considerations for meteorological conditions and regional conditions.
- Establishment of operational frameworks with considerations for impact from lightning strike on drainage pumps and power failure
   66% countermeasures, as well as water levels of rivers, inspection of drainage pumps prior to flooding, improvement of visibility for road users, etc.
- Coordination with relevant organizations is enhanced to establish reliable frameworks to deal with floods (information communication networks and the like with relevant organizations are verified before floods occur)

#### Number of underpass sections (carriageway only) nationwide



#### ☐ Countermeasure examples (information boards and drainage pumps)

sections

Roadside













# 3 Snow and Cold

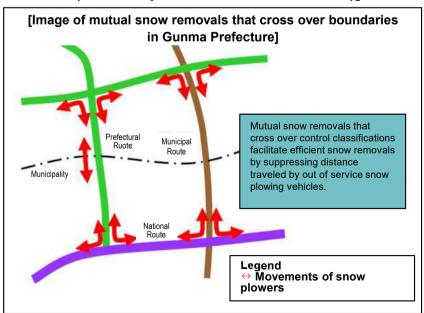
#### Snow and cold weather countermeasures:

Advance preparation & responsive actions for heavy snowfall



- O Press release is <u>published</u> on the website in advance to call on users to <u>refrain from going out during heavy</u> <u>weather for matters that are not necessary or of urgence</u> by announcing in advance <u>sectors where road</u> <u>closure is predicted due to heavy snowfall</u> or where <u>snow removal is prioritized</u>, and also <u>call on people</u> to be thoroughly prepared with winter gear if going out is unavoidable.
- O Efficient snow removal operations are conducted in <u>prioritized snow removal sectors</u>, <u>by closing roads</u>, <u>enhancing framework or snow removal framework</u>, as well as by <u>coordinating road managers</u>.
- O In the event gridlock or the like are predicted, <u>early road closures</u> are performed to conduct <u>concentrated snow</u> <u>removal</u> to minimize the time during which roads are closed.
- O In the event a gridlock occurs, Revised Basic Act on Disaster Control Measues is applied to move vehicles rapidly.

[Snow removal framework that crosses over boundaries of road managers in prioritized snow removal sectors (an example in Gunma Prefecture)]



[First application of Revised Basic Act on Disaster Control Measures (National Route 192; December 2014]



 \* Nationwide application status of Revised Basic Act on Disaster Control Measures (as of March 2015)

There are 48 sectors to which the law applies, of which 15 sectors have relocated vehicles.

There are 3 sectors in which forcible vehicle relocations were conducted with the driver absent.

#### Snow and cold weather countermeasures:

#### Securing paths for road traffic during Winter season



- Snow and cold weather projects, such as snow removals, snow preventions, frozen snow damage prevention and the like are promoted, in order to secure road traffic during Winter season.
- Plans for Winter season barrier-free countermeasures, such as melting of snow on sidewalks, are formulated and promoted in an aim to reduce traffic impediments for pedestrians arising from accumulating and freezing snow.
- Substantiated snow plow operator training and simplification of snow plow operation are sought, in order to pass on snow removal techniques and to sustain snow removal framework.
- Snow removal



 Snow protection countermeasures (avalanche prevention fence)



Snow freeze damage prevention



Winter season barrier-free countermeasures



#### Snow and cold weather countermeasures:

#### Call on drivers to install winter gear on vehicles



#### Responsive actions taken on gridlocked (stuck) vehicles

 Concentrated snow removal performed by closing roads to secure early passage for traffic and raise awareness of drivers.



Implementation status (chain fitting verifications)



Implementation status (coordinated with local police)

Chain fitting instructions (actual condition surveys) performed by road managers (Hokuriku Regional Development Bureau) and police

[Example] Date and time: February 2, 2012 (Thursday) at 22:00 to February

3 (Friday) at 2:15

Location: General National Route 49 at Tsugawa Snow Removal Station (Beyond agricultural land in Nomura of Aga Town in Higashi Kanbara County of Niigata Prefecture)



Description: Verification of chain fitting on large vehicles (5 tons and more)

- Chain fitting instructions given to drivers of vehicles with no chains fitted.
- Verifications conducted on cumulative total of 37 vehicles
  - → There were 33 vehicles that had no chains fitted (89%)



- Concentrated snow removal performed by closing roads early
- Raising awareness of drivers about their morality

### (Ref.) Example of the Use of New Information Technology (2)



- ■Twitter was used to provide information on the state of nationally managed highways and cautionary information during snowfall.
- For the purpose of providing timely information on the Kofu River Highway, information was transmitted using Twitter with 6 staff members on a 24 hour cycle..
- Outgoing information made effective use of information on traffic regulation conditions and snow conditions using CCTV cameras etc. installed on the road.

• The most tweets was achieved on Saturday 15th, where information was transmitted about every 30 minutes.

#### 1 No. of Tweets

	Tweets
Fri 14 <sup>th</sup>	26
Sat 15 <sup>th</sup>	53
Sun 16 <sup>th</sup>	20
Mon 17 <sup>th</sup>	14
Tue 18 <sup>th</sup>	14
Wed 19 <sup>th</sup>	8
Thur 20 <sup>th</sup>	2
Total	137

③Abt. 1,000 Followers



Increase to abt. 5,000 people

**4**Max. of 925 retweets (Feb 15 Shelter Information)





Traffic regulation information: As of 0:15 AM Sat Feb 15<sup>th</sup>
Highway 20 Anayama region, Anayama, Nirasaki City, Yamanashi
Traffic trouble due to stacked up vehicles.
When chains are slipping, please adjust them as soon as you can in a safe

# 5. Disaster Prevention Measures of the Okinawa General Bureau

- 1 Disaster preparedness work
- ② Possibility of a large-scale earthquake occurrence in Okinawa
- 3 Assumed damage scenario following the occurrence of a large-scale earthquake
- 4 Measures for issues
- (5) TECH-FORCE (Technical Emergency Control Force)





# Affairs under the jurisdiction of Disaster Management Division (Affairs related to Disaster prevention / Disaster countermeasures)

O Examining various actions taken in preparation for largescale disasters

(Okinawa disaster management liaison committee, Committee for promoting disaster management measures in Okinawa)

- O Planning and implementing various disaster prevention drills and participation in drills of other organizations
- O Continuous review of the business continuity plan of the Development and Construction Department
- O Signing agreements with relevant organizations
- O Maintenance of disaster prevention machines
- O Management of Okinawa General Bureau helicopters
- O Responding to various disasters such as typhoons
- O Work related to dispatching TECH-FORCE
- O Support to local governments in the event of a disaster
- O Educational activities on disaster prevention

#### Okinawa General Bureau Organizational Rules (excerpt)

Article 62 Disaster Management Division is in charge of the following affairs:

- 1. Matters concerning the coordination related to engineering works plan for emergency recovery and damage prevention of public works facilities coming under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism that are damaged due to a natural disaster or explosion or any other unusual man-made disaster.
- 2. Part of the affairs coming under the jurisdiction of the Development and Construction Department that are related to disaster management action plan as per the Disaster Countermeasures Basic Act.
- 3. Matters related to entire administration of dispatching TECH-FORCE.

Development and Construction Department Annual disaster prevention training plan [Fiscal 2019]

Period	Training name	Training outline
Apr.	Disaster initial response training	Improvement of initial response handling of emergency management personnel of Regional development Bureau
May	Large screen TV conference equipment operation training	Description of how to operate large screen TV conference equipment to personnel to be gathered at a disaster
	Emergency training (storm and flood damage)	Setting up initial response system, graphic transfer of damage situation and information communication with related organizations, etc.
Jul.	Training for setting up and operating Okinawa Disaster Countermeasures Headquarters	Setting up a Disaster Countermeasures Headquarters and liaison with relevant agencies, sponsored by Okinawa Pref. against earthquake and tsunami
	Emergency management communication training (first half fiscal 2019)	Operation training of communication equipment
Sep.	Okinawa Pref. Comprehensive Emergency management training	Okinawa Pref. sponsored comprehensive emergency management training against disasters (Initial response training, various disaster countermeasure activity training)
Oct.	Naha City Comprehensive Emergency management training	Naha City sponsored comprehensive emergency management training against disasters (Initial response training, various disaster countermeasure activity training)
Nov.	Okinawa Petro chemical industri- al complex comprehensive emergency training	Training assuming disaster of fire and fuel outflow at petroleum industrial complex
	Training for emergency machine operation	Setting and operating Management Headquarters vehicle and drainage pump vehicles.
Dec.	Emergency management communication training (second half fiscal 2019)	Operation training of communication equipment
	Chura shima Rescue training	Disaster imagination game assuming large-scale earthquakes and tsunamis in Okinawa Pref.
	TEC-FORCE training	Method to investigate damage situation and method to take photographs for public release
Feb.	Emergency management training (Emergency gathering/safety check)	Setting up initial response system, facility inspection, information communication with related organizations, emergency restoration



### Disaster prevention office, emergency drill in session

- O The new government office building of the Okinawa General Bureau was equipped with the following when it was constructed (March 2008).
- O Main Equipment
  - Large-size display equipment (98" 1 screen, 50" 2 screens, 42"12 screens, 1 pair of speakers)
  - Displays images (CCTV, Satellite communication vehicles, Satellite Portable Station) and weather information.
  - IP video conferencing equipment (The display of the Large-size display equipment is shared)
  - Setting up wireless HDMI。







Images captured by radio control helicopter

disaster prevention helicopter 80

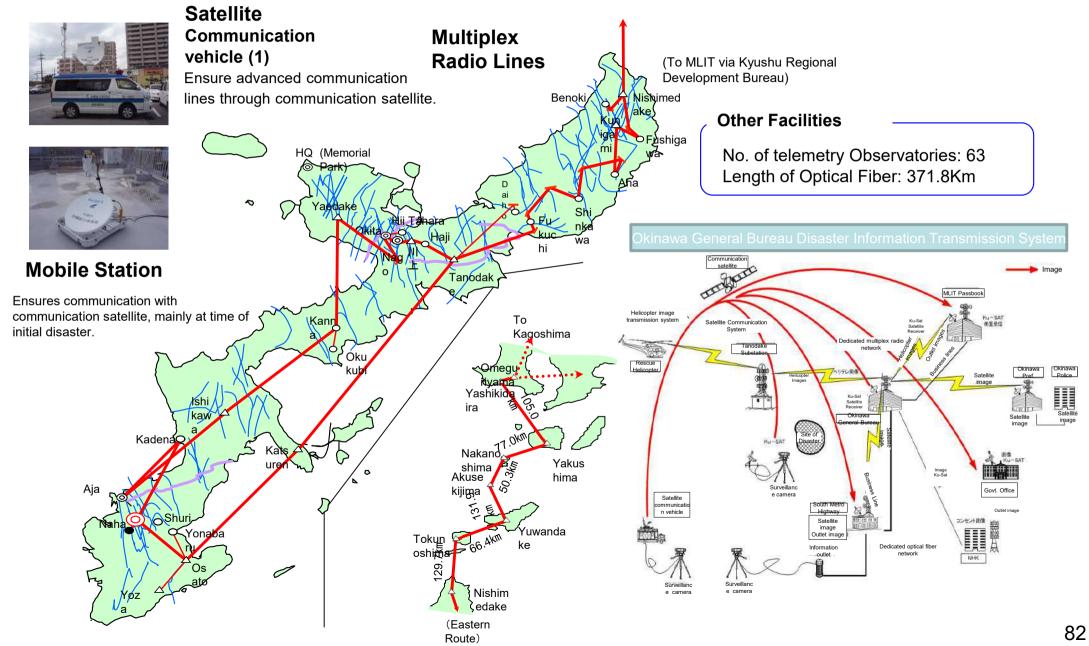


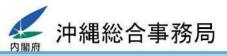
### Installation status of information-gathering cameras





# Telecommunications equipment maintenance status 1/2





## Telecommunications equipment maintenance status 2/2



#### Radar rain gauge

The Yaedake radar rain gauge was updated from the conventional C band to C band MP radar in FY 2016 and with subdivision of mesh and reducing the interval between observations, an accurate and real time transmission was achieved.



#### K-λ (Ministry of Land, Infrastructure, Transport and Tourism Kokudokoutsuu Land Mobile system By Digital Access)

Land Mobile system By Digital Access (VHF: 150 MHz band) developed by the Ministry of Land, Infrastructure, Transport and Tourism, as a new means of mobile communication.

Wide area communication is possible, and sound can be transmitted clearly by digitalization.



#### **Public BB**

(Ministry of Land, Infrastructure, Transport and Tourism Public Broadband Mobile Communication System)

Public wireless equipment using a frequency band used for analog broadcasting enables long-distance high-speed data communication, and wireless communication from the sections beyond the range of vision of the other party is also possible.



# Image information sharing system

It is a system for checking CCTV camera images from the PCs of officials of the MLIT, Regional Development Bureaus, offices, etc. which are also viewable by the prefectural government and prefectural police who have entered a disaster agreement.



## 沖縄総合事務局 災害対策用車両等



# Disaster Response Helicopter (1)

Used for initial study of disasters and to examine disaster hazards.



# **Emergency Bridge Assembly (3 units)**



# Disaster Response HQ Vehicle (1)

Serves as a site office for site direction, information gathering and the examination of measures etc.



# Bridge Inspection Vehicle (1)

Used to inspect structures such as bridges to verify their safety.



#### Lighting vehicles (3)

Used for lighting sites for night time recovery or monitoring work.



# Drainage Pump Vehicle (1)

Used to limit damage from flooding etc. in the event of a flood.



# Signage Vehicles (2)

Provides information to general drivers of traffic regulation or road conditions due to construction or disaster.



# Support and Assistance Menu of Activities made Available to Local Governments Stricken by Disasters

#### Principal support and assistance menu of activities

- ① Distributing video images from disaster helicopter as well as providing images to disaster stricken areas.
- ② Loaning and dispatching machinery for disaster management (illumination vehicles and drainage pump trucks, etc.), communication equipment (satellite communication vehicles, Ku-sat, etc.), as well as equipment and materials (portable emergency bridges, etc.).
- 3 Dispatching ships.
- 4 Effectively utilizing "Roadside Stations" and "Directly Managed Dam Peripheral Facilities" when disaster strikes.
- ⑤ Support for disaster surveys and disaster impacted building emergency risk determinations conducted by TEC-FORCE (Technical Emergency Control FORCE).
- 6 Dispatch of liaisons.
- (7) Technical advice and support relating to construction methods for disaster emergencies and restorations.

#### Principal materials and equipment for disaster management



Helicopter of Okinawa General Bureau



Portable emergency bridges



Ships

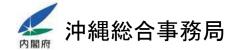


Dispatch of TEC-FORCE units



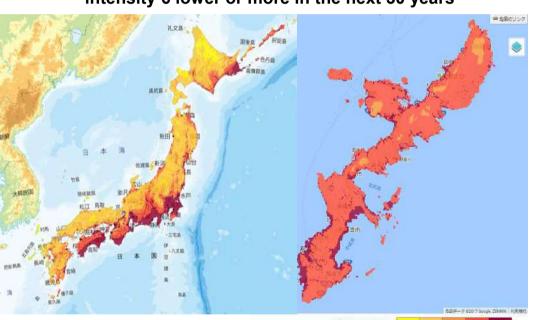
# 2Possibility of a Large-scale Earthquake Occurrence in Okinawa

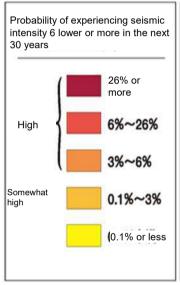
### 2 Possibility of a Large-scale Earthquake Occurrence in Okinawa



- In Okinawa the probability of an earthquake of seismic intensity 6 lower or more in the next 30 years is 6 to 26%! Compared to other areas all over Japan, the probability is high!
- Okinawa being an island prefecture, support from other areas cannot be expected for the time being!
- → Early response immediately after the occurrence of a large-scale earthquake and tsunami disaster is important

### Probability distribution of areas that will experience seismic intensity 6 lower or more in the next 30 years





(Source) Headquarters for Earthquake Research Promotion Website

Cities	Shinjuku ward (Metropolita n government offices)	Shizuoka City	Osaka City	Kochi City	Fukuoka City	Miyazaki City
Probabili ty	47%	69%	27%	74%	8%	45%

Cities	Naha City	Nago City	Kuniga mi Village
Probab ility	40%	30%	39%

(Note) Obtain probability values of (250 m square) mesh obtained at the locations of prefectural government buildings and city offices Probability of natural disasters and accidents occurring in the next 30 years

<ul><li>Injured due to a traffic</li></ul>	24%
accidents	6.8%

Death due to cancer 6.8%

Sneak thievery3.4%

Afflicted due to a fire Snatch theft

Afflicted due to heavy 1.2%

rains
Afflicted due to a

• typhoon 0.48%

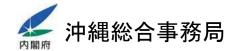
• Death due to aircraft 0.0029

Calculated with certain assumptions based on statistical data from 2004 and defense white papers

1.9%

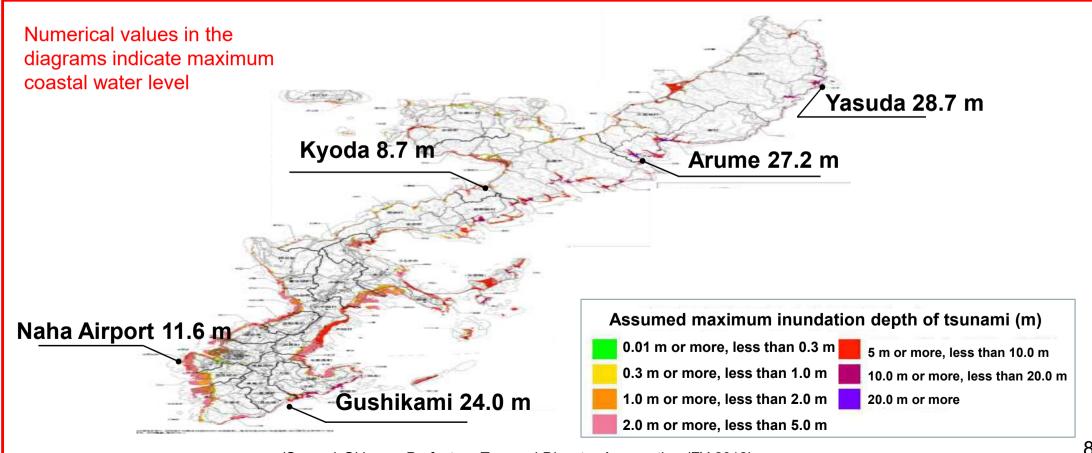
0.50%

### 2 Possibility of a Large-scale Earthquake Occurrence in Okinawa



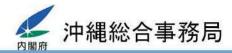
- Tsunami of up to about 28 m on the Okinawa main island! (Earthquake off the Southeastern coast of the Okinawa main island consisting of three asperities)
- The inundation height of the past "Yaeyama earthquake tsunami" of 1771 was up to 44 m!
- Okinawa being an island prefecture, support from other areas cannot be expected for the time being!
- → Early response immediately after the occurrence of a large-scale earthquake and tsunami disaster is important

#### **Assumption for Tsunami Disaster in Okinawa Prefecture**



# 3 Assumed Damage Scenario Following the Occurrence of a Large-scale Earthquake

# 3 Assumed Damage Scenario Following the Occurrence of a Large-



#### [Ports, Fishing ports, Airport]

- O Damage to the wharfs and runways etc. due to an earthquake, direct damage due to a tsunami and damage due to rubble etc. may occur.
- O It is estimated that it will take about 5 to 10 days to clear the routes of obstacle at the Naha Port. Naha airport is extensively inundated and there is a possibility that takeoff and landing of aircrafts will become impossible for the time being.
- For a period of 1 week to about 10 days after the disaster, there is no choice but to carry out our disaster response with the resources (goods, equipment, fuel etc.) on the island.

#### [Major Road Networks]

Many of the major roads are in the coastal low-lying areas, and the function of road networks will remarkably deteriorate due to tsunami rubble, which may cause hindrance to the traffic of emergency vehicles and vehicles transporting supplies.

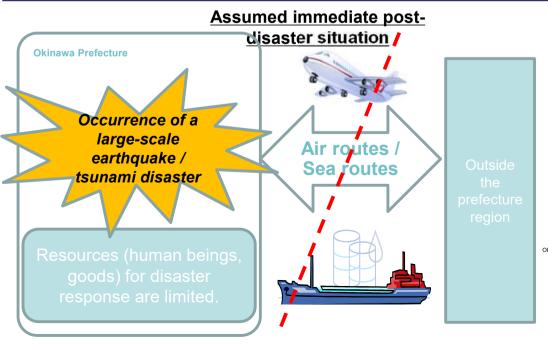
#### [Lifeline infrastructure such as electricity, oil, gas, water and sewage]

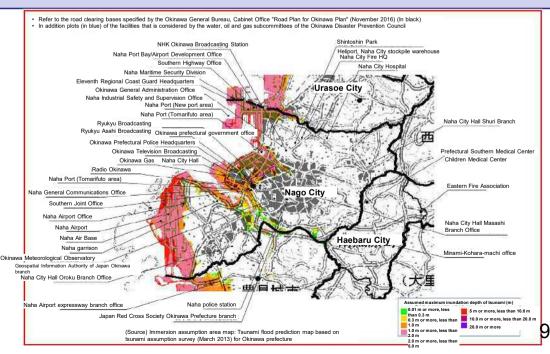
- About 60% of the electricity supply facilities, about 40% of the oil and gas fuel storage facilities, and about 90% of the water supply and sewage facilities\* are located in the coastal low-laying areas of the Okinawa Prefecture.
- O Many are within the tsunami inundation hazardous area and a certain period is required before recovery.
- O It is necessary to consider various types of disaster prevention measures considering the period until the lifeline infrastructure such as electricity is restored.

#### [Administrative Agencies]

- O Earthquake-proofing of all public facilities has not been completed.
- O According to the local governments, there is a possibility that disaster response work may be hindered due to water outage, blackouts, disconnection of communication lines etc.

\* For water supply, large-scale facilities managed by the Okinawa prefectural enterprise bureau are also taken into consideration







# 4 Measures for Issues

(4) Measures for Issues Recommendations of the Disaster Response Promotion Council Supporting Sustainable Development of Okinawa



Summary of FY 2017 (Announced in a press conference on March 9, 2018)

### **Assumed Countermeasures**

#### [Means of Information-gathering, Sharing and Communication]

- O Effective utilization of helicopters, deploying drones etc. in advance
- O Enhancement of means to communicate with the disaster site
- O Providing updates on disaster situation through collaboration with the news media (Stockpiling (food, water, daily necessities, fuels))
- O Stockpiling of various items for a period of 1 week to 10 days
- O Reinforcement of fuel tanks for emergency power generation
- O Promotion of stockpiling of daily necessities etc. at administrative agencies taking into account evacuees

#### [Clearing Road Obstacles]

- O Response based on **comprehensive disaster agreement** for command order (**signed on** February 1, 2018) O Formulation and promotion of a concrete plan to secure fuel and equipment
- O Earthquake-proofing of the structures, bridges, etc. on the emergency transportation roads

[Emergency Recovery of Ports and Airports]

O Sophistication of port recovery scenario O Formulation and promotion of a concrete plan to secure fuel and equipment O Earthquake-proofing of wharfs, airport taxiways etc.

#### [Transportation of Goods]

- O Setting-up of a transportation base to efficiently transport supplies for disaster countermeasures and equipping a storage base [Fuel Supply]
- O Giving grants for installing emergency power generation system in gas stations at 10 m above the sea level or higher O Considering multiple fuel storage points and fuel transportation methods

#### [BCP (Business Continuity Plan) / Disaster Mitigation Measures]

- O Priority implementation of the undergrounding along the emergency transportation routes O Urgent formulation of a plan for National Resilience O Installation of emergency power generation system
  [Island Municipalities]
- O Strengthening evacuation measures, such as tsunami evacuation tower O Securing means of communication that are resistant to disasters O Earthquake-proofing of roads, wharfs, airport runways etc.

[Strengthening Cooperation System of Relevant Organizations through Practical Disaster Prevention Training etc.]

O Strengthening the support system O Implementation of blind training etc. O Thorough implementation of the PDCA cycle through confirmation, verification and improvement of disaster prevention drill scenarios

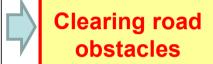


### 4 Measures for Issues Clearing Road Obstacles 4 沖縄総合事務局



- O Clearing of road obstacles is a process to clear rescue routes with a minimum required width (about 4.5 m) by means of a bare minimum debris treatment and a simple level difference correction, facilitating the traffic of emergency vehicles etc.
- Necessary before implementing emergency recovery in large-scale disasters

Occurrence of disaster



**Emergency** recovery



Reconstruct ion

National Route 45 Iwate prefecture Kamaishi City Heita (East Japan great earthquake)





### 4 Measures for Issues Clearing Road Obstacles 🚜 沖縄総合事務局

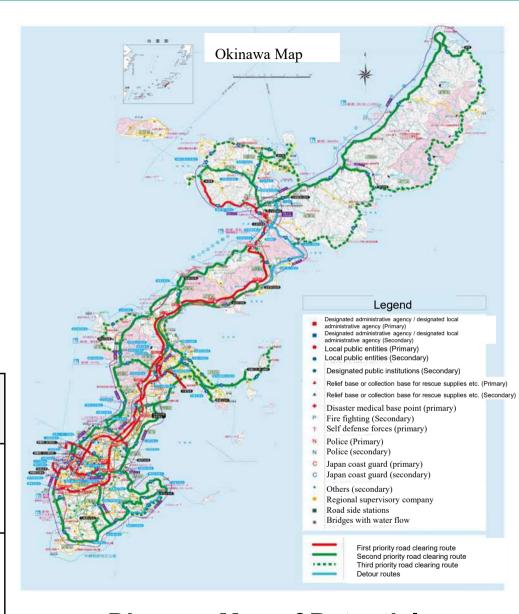


### Criteria for deciding potential routes for obstacle elimination (draft)

- Communicating the location decided for clearing obstacles.
- Road width is 4.5 m or more (Considering 3.8 m large vehicles of Self Defense Forces)
- The roads are designated as emergency transportation roads or emergency traffic roads

Table Setting priorities for Clearing Obstacles of Potential Roads (draft)

Setting priorities for Obstacle Elimination of Potential Routes (draft)	Definition	Objectives of clearing obstacles
1 (Clearing obstacles from potential routes with highest priority)	Framework of routes connecting the highest priority clearing obstacle locations	Clearing obstacles within 1 day
2 (Clearing obstacles from potential routes with second highest priority)	Routes connecting the potential routes for clearing obstacles with highest priority to the second-highest priority clearing obstacle locations	Clearing obstacles within 3 days
3 (Clearing obstacles from potential routes with third highest priority)	Routes connecting the potential routes for clearing obstacles with highest and second-highest priority, with third-highest priority locations	Clearing obstacles within 7 days



### **Diagram Map of Potential** Routes for clearing obstacles (draft)

### 4 Measures for Issues Clearing Road Obstacles 編沖縄総合事務局



### 2016 Implementation Status of Clearing Road Obstacles Training









#### Measures for Issues Strengthening of the Airport Emergency Recovery Implementation System

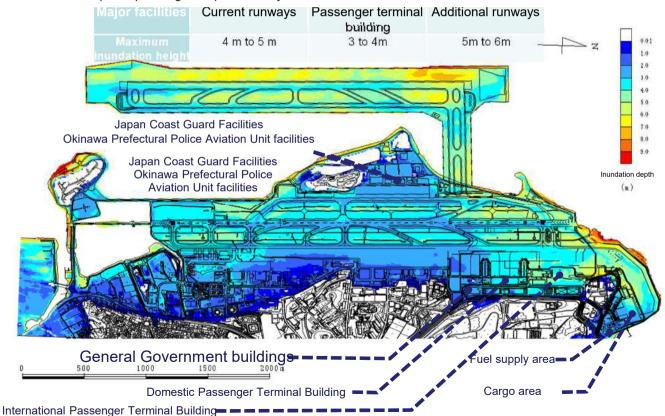


#### Assumed damage

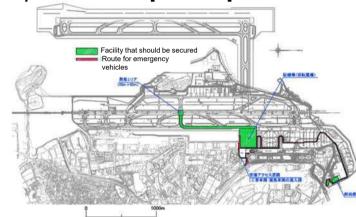
- Naha Airport is assumed to be inundated with a tsunami of 3 to 5 m, due to which there will be extensive flooding on the runways and in the terminal building etc. The airport will stop functioning as power supply will also get damaged.
- Even after the tsunami recedes, the water over a wide area surrounding the runways will not drain, sediment will accumulate in all the inundated areas, and a lot of airport functions will be hampered with destruction of the fence around security areas.

#### Measures

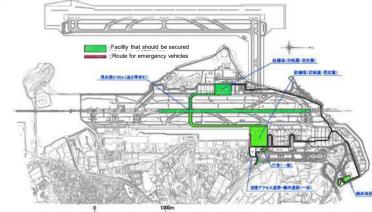
- Strengthening of emergency recovery implementation system through sophisticated recovery scenarios
- Formulation of concrete plans, such as determining details to secure necessary fuels
- Securing equipment for emergency recovery
- · Earthquake-proofing of airport taxiways etc.



1) Ensure emergency, life-saving activities and emergency supplies, personnel transportation and acceptance functions [Rotorcraft]



2) Ensuring emergency supplies, personnel transportation and acceptance functions [Fixed-wing Aircraft]



\* Regarding the range of facilities to be secured, the area required for the activities needs to be reviewed in the future.

# (4) Measures for Issues Gathering and Sharing of Information and Strengthening Communication Means



- Effective utilization of resources, such as helicopters, for information gathering
- UAV maintenance, acquisition of technology applied on a regular basis and training
- Maintenance of portable means of communication such as mobile radio
- Considering installation of mobile phone base stations on port services boats etc.

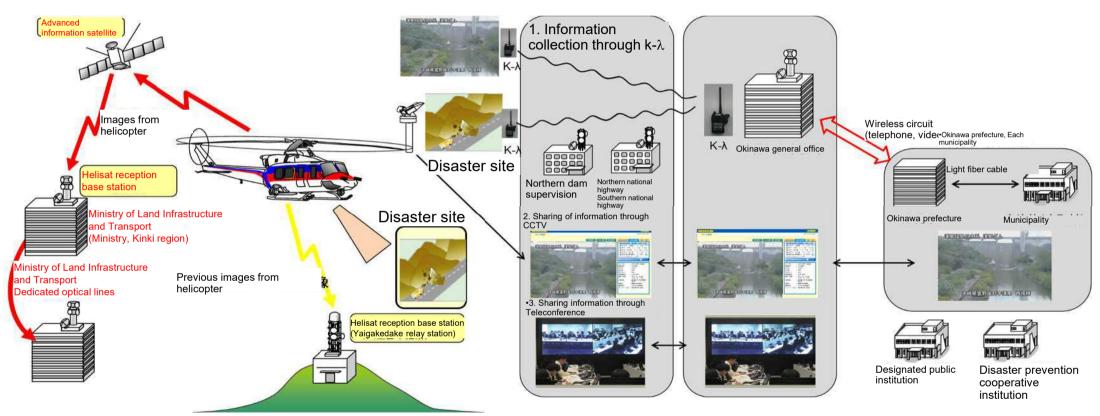


Diagram Information gathering through helicopter satellite images and shared images

- Conventional helicopter video transmission system: Since the video is transmitted to a station via the terrestrial reception base station, in the <u>areas</u> (mountains, maritime coastal areas, etc.) which are <u>outside the coverage zone</u> of the base station, video cannot be seen in real time
- Helicopter satellite: Since satellite channels are used, <a href="high-quality images can be transmitted">high-quality images can be transmitted</a> in real time <a href="from any place">from any place</a> on Okinawa, which is an island prefecture.

Fig. K-λ\* Information gathering through CCTV and video conferencing, and shared images

(Ministry of Land, Infrastructure, Transport and Tourism Kokudokoutsuu Land Mobile system By Digital Access)

### 4 Measures for Issues Strengthening Fuel Supply System



- O The Okinawa General Bureau, the Petroleum Commerce Association and the Petroleum Industry Cooperative Association have **signed an agreement for clearing obstacles from roads and ports and to give a priority to fuel supply emergency vehicles**, it is necessary to provide details such as the amount to be secured and delivery locations etc.
- On the main island of Okinawa, though there are 276 service stations, of which 170 gas stations are at 10 meters above the sea level or higher, only 9 places are equipped with emergency power generation system.
  - O When commercial power supply is stopped, refueling is difficult at most filling stations. Therefore, it is necessary to promptly equip the filling stations with emergency power generation system.

(Agreement on the Supply Agreement of petroleum oil fuels in times of disaster)

(Signed in November 2015)

#### Objective

Article 1 This agreement, which stipulates that if there is a shortage of petroleum fuel (hereinafter referred to as "Fuel") in the Okinawa prefecture due to the occurrence of a large-scale disaster (hereinafter referred to as "Disaster event"), the Okinawa General office that manages the important facilities for disaster measures must ensure fuel supply through central petrol filling stations as well as small fuel delivery locations for clearing obstacles of roadways, ports and harbours, and is entered into between the Cabinet Office, Government of Okinawa General Office (hereinafter referred to as "Party A") and The Okinawa Prefecture

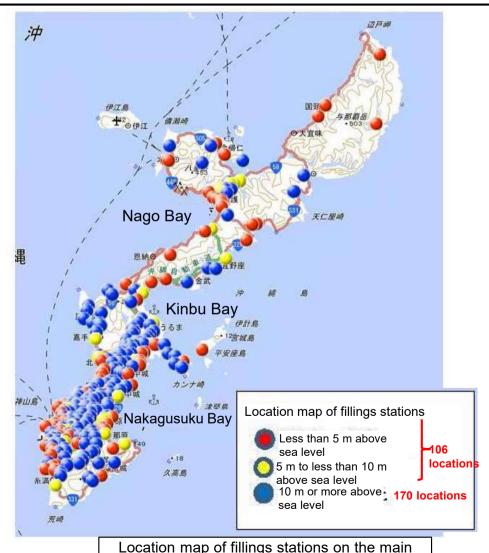
Oil Commercial Federation and Okinawa Prefecture Oil Industry Cooperative Federation (herein referred to as "Party B").

(Cooperation request for supply)

Article 2 In the event of a disaster, Party A shall be able to request the cooperation for the following from Party B.

- (1) Priority supply of fuel to important facilities, etc. for disaster measures managed by Party A.
- (2) Priority supply of fuel to vehicles, ships, and other emergency vehicles, such etc. to clear obstacles from roads and ports managed by Party A.
- 2 The request set forth in the preceding paragraph shall be made in writing. However, if the request is made orally, the document of the request shall be promptly presented at a later date.

To promote the introduction of LP gas and petroleum products "self-storage" in comfortable critical infrastructure in order to promote their introduction to evacuation sites where large numbers of evacuees will be present, and to strengthen disaster response capabilities.



island of Okinawa 276 service stations

### 4 Measures for Issues Stockpiling (Food, Water, Daily Necessities, and Fuel) 4 沖縄総合事務局



- Stockpiling of food, drinking water, fuel for emergency power generation equipment lasting for 7 to 10 days
- · Storage places for food and drinking water, reinforcement of fuel storage tanks

#### Subsidy for the project cost promoting socially critical infrastructure, such as fuel

#### **Business contents**

#### Business purpose and outline

- In the event of a disaster, when a road is damaged, there is a possibility that the supply of fuel will be delayed if just supply side such as gas stations are strengthened, also on the customer side, securing fuel for self-generated electricity to operate as "Self-defence stockpiling" is an effective measure to ensure that business is not interrupted during disasters. Even during the Kumamoto earthquake in April, the effectiveness was demonstrated (\*)
- \* A hospital in Kumamoto City continued its work using oil tanks and inhouse generators installed under the support of this project at the time of power outage.
- Therefore, to promote fuel stockpiling in evacuation centres and social critical infrastructure, we support installation of disaster-response type LP gas tank and oil tank etc

#### Target results

To promote the introduction of LP gas and petroleum products "selfstorage" in comfortable critical infrastructure in order to promote their introduction to evacuation sites where large numbers of evacuees will be present, and to strengthen disaster response capabilities.

#### **Condition (Target, target action, assistance percentage)**





## 4 Measures for Issues Stockpiling (Food, Water, Daily Necessities, and Fuel) 禁 沖縄総合事務局



#### **Securing tap water 1/2**

- Due to a large-scale disaster, supply is likely to be impaired due to damaged pipelines from the water sources to water purification plants and from water purification plants to individual houses.
- Enterprise bureau's water purification plants located in the coastal area are likely to take time to recover due to the earthquake and tsunami damage.
- Since it is an island prefecture and it takes time to get support from other business entities, a plan to sustain in the initial response phase (one month) is necessary.

Actions taken in the initial response phase assuming that the water supply system is damaged, are as follows:

Flow of water in the water supply area on the main island of Okinawa

#### Water is distributed to each water purification plant ranging from the northern region to the central and southern region through underground tunnels, conduit pipes etc. Nago water purification plant **Daibo** Benoki dam Fushigawa dam Aha dam Arakawa Ishikawa water dam Fukuji dam purification plant Haneji dam "山城ダム (県企業局) Kushi water purification plant 倉敷ダム Kanna dam Legend Damaged due to Kin dam earthquake Chatan water purification plant Damaged due to tsunami Damaged due to earthquake Nishihara water and tsunami purification Leaend plant National dams (completed) Prefectural dams River-water intake pump station Kadena battery of wells Water purification plant Regulating water-pipe tunnel Water conduit pipes (including pipes dedicated to industrial u. Water conduit tunnels Conduit water Submarine water supply pipes pipes

#### **Assumption of damage to major facilities**

Water source

Dams (National dams): Slightly damaged (Possible to supply raw water)

River pumping station: Damaged

Seawater desalination facilities: Damaged

Groundwater: Damaged

**Purification** plant

Nago water purification plant: Damaged by earthquake Kushi water purification plant: Damaged by earthquake and tsunami Ishikawa water purification plant: Damaged by tsunami Nishihara water purification plant: Damaged by earthquake and tsunami Chatan water purification plant: Damaged by earthquake and tsunami (partly earthquake resistant)

#### **Emergency water supply setup scenario**

- O Amount of purified water that can be secured within the main island of Okinawa at the time of a disaster
- → About 1.65 million m3 (immediately after disaster to within 1 month)
- Regulating reservoir, Distributing reservoir, Each household tank → About 750,000 m<sup>3</sup>
- Recovered water purification plants → About 900,000 m<sup>3</sup> O Water distribution intensity unit → Set by referring to the guidelines of the Ministry of Health, Labor and Welfare
- Occurrence of disaster to Day 3: - Day 4 to Day 15: 20L/man days
- Day 16 to Day 27: 50L/man days - Day 28 to Day 30: 100L/man days

3L/man days

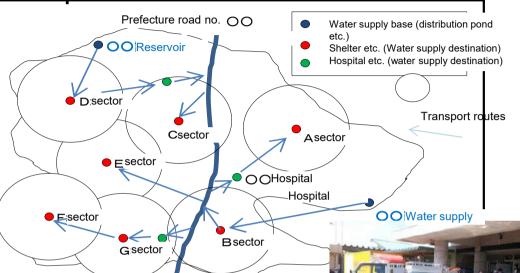
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#### 4Measures for Issues Stockpiling (Food, Water, Daily Necessities, and Fuel.) 沖縄総合事務局



#### **Securing tap water 2/2**

Conceptual drawing of emergency water supply at municipal level



#### Efforts taken to prepare for damages to water supply utilities

Seismic relevance ratio of the main pipelines

City Name	Seismic relevance ratio
. Naha city	24.5
Okinawa City	29.9
Urasoe City	16.8
Ginowan city	48.1
Nago City	18.2
Itoman City	6.4
Tomigusuku city	10.3
Uruma City	18.0
Nanjo City	10.9



Stockpiling of equipment in preparation for disasters (Enterprise bureau)

Source: 2017 Outline of water supply in Okinawa Prefecture

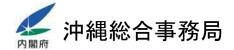
#### Future challenges etc.

O Considering the guidelines of the Ministry of Health, Labor and Welfare on post-disaster emergency water supply, it is possible to supply water for about a month using the water obtained from regulating reservoirs, each household tank and by emergency recovery of a part of water purification plants.

Emergency water supply by water trucks (Nobeoka City Website)

- O Meanwhile, securing means of water transport from adjusting reservoirs, distributing reservoirs and water supply bases to evacuation centers is an issue.
- Shortage of water trucks in the prefecture. (1 water truck (1.8 t), 22 water supply tanks (1.0 t or more))
- Promotion of earthquake-proofing of the main pipelines by the municipalities (water works) (Presently 18.1%)
- O To secure water supply after the initial response phase (within one month of disaster) and full-scale recovery of the water supply system, external support for water supply, recovery of water supply system, etc. is necessary.
- O Planned renewal and earthquake-proofing of aging water supply facilities intended at minimization of earthquake damage and speedy recovery, as well as promotion of stockpiling etc. of recovery support equipment in preparation for a disaster
- O Formulation of emergency water supply plans (installation of water supply bases, water distribution and transportation methods etc.) by each water supply utility.

### (4) Measures for Issues Signing of Comprehensive Agreement



[Objectives] The objective of this agreement is to contribute to the prevention of escalation of damage and speedy recovery of the affected facilities, with respect to the damage caused to public works facilities managed or being constructed by the Development and Construction Department or Department of Civil Engineering and Construction of the Okinawa General Bureau, and other works falling within the scope of the Okinawa support of Party A and Party B. or the heads of offices under the jurisdiction of Party A and Party B.

**General Bureau** 

Party B: Governor of Okinawa

Party C: Chairman of the Okinawa

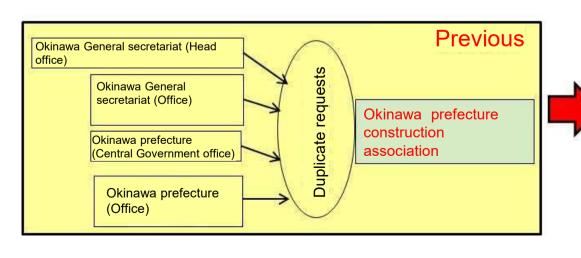
#### [Details]

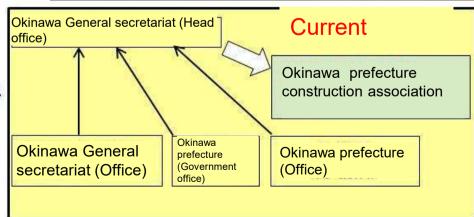
- O Based on the lessons learnt from the Great East Japan Earthquake and the Kumamoto earthquake, entering into a disaster agreement in preparation for a large-scale disaster has gained momentum.
- O Okinawa being an island prefecture, in the event of large-scale earthquake and tsunami disasters, a certain amount of time is required before help reaches from other prefectures. Therefore, it is mandatory to carry out emergency recovery such as obstacle elimination from roads, by effective utilization of the limited human resources and construction equipment of the building contractors within the island.

#### [Issues]

- O While there are various requests from the center and prefectures, there are cases where due to duplicate requests, there is confusion in the actions taken based on an agreement. [Measures]
- O To prevent duplication of cooperation requests, request routes are organized and clarified.
- O In the last fiscal year, plan and timeline for obstacle elimination from roads have already been formulated. Recently, a handing over ceremony of a comprehensive agreement between the Okinawa prefecture and Okinawa Construction Industry Association (357 member companies) was held (February 15, 2018). It has become possible to take speedy measures due to the conclusion of the agreement.







# 4 Measures for Issues Cooperation System Among Isolated Island Municipalities and Related Organizations

沖縄総合事務局

[Isolated Island Municipalities]

- Strengthening of evacuation measures by maintenance of tsunami evacuation tower, designation of shelter buildings, etc.
- Considering improvement in the seismic performance of wharfs that support ferries or RORO ships that don't require cargo handling equipment
- Formulating specific action plans to prepare for a prompt emergency recovery by entering into a disaster support agreement with building contractors within the island or an area, and relevant national and prefectural organizations.

[Cooperation among Relevant Organizations through Practical Training etc.]

- Implementing ongoing initiatives to further strengthen the communication among related organizations through training, assuming the worst situation
- Regularly held evacuation drills and disaster prevention education etc. at elementary, middle and high schools



Image Yonaha district disaster prevention center (Tsunami evacua



Image FY 2016 General disaster prevention drill of Okinawa prefecture



Image Government's role-playing simulation exercise



Image Earthquake and Tsunami evacuation drill



Image Disaster prevention education 03 session

# 5TECH-FORCE (Technical Emergency Control Force)







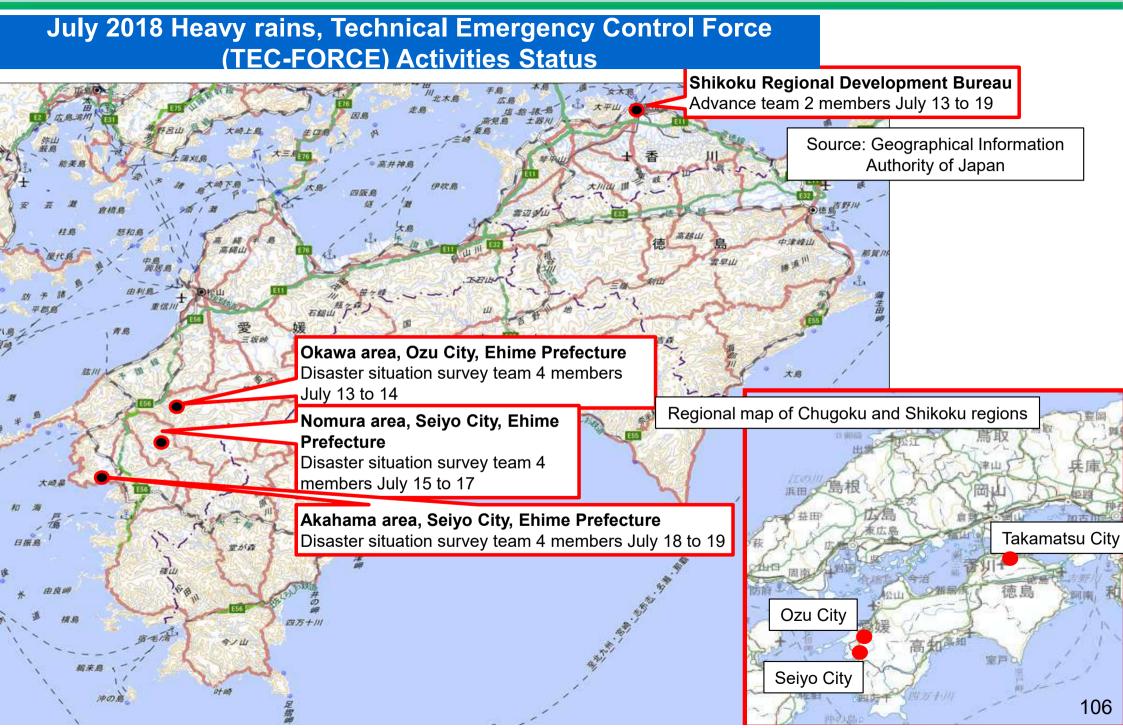
緊急災害対策派遣隊

# TEC-FORCE Technical Emergency Control FORCE

Support to the local municipalities for quick recovery for disaster areas

Investigating the damage and submitting reports Recovery activities are carried out by using equipment which are used for disaster countermeasures







July 18 Seiyo City

#### July 2018 Heavy rains, Technical Emergency Control Force (TEC-FORCE) Activities Status from July 12 - 19, Place: Seiyo City, Ozu City in Ehime Prefecture



Field meeting with the person in charge of Seiyo city



Measurement and survey of the extent of road damage



Survey of slope failures due to heavy rain



#### July 2018 Heavy rains, Technical Emergency Control Force (TEC-FORCE) Activities Status from July 12 - 19, Place: Seiyo City, Ozu City in Ehime Prefecture



Survey of roads that are closed to traffic due to slope failures



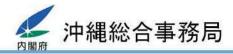
Survey of slope failures due to heavy rain



Survey of slopes under a retaining wall collapsed due to heavy rain



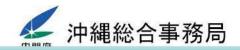
Survey of roads in which large cracks have appeared due to heavy rain



# July 2018 Heavy rains, Technical Emergency Control Force (TEC-FORCE) Activities Status from July 12 - 19, Place: Seiyo City, Ozu City in Ehime Prefecture



### 5TEC-FORCE West Japan Heavy Rains, Dispatched to Shikoku



# July 2018 Heavy rains Debriefing session on Technical Emergency Control Force (TEC-FORCE) activities

- O The Okinawa General Bureau TEC-FORCE dispatched to the Shikoku region to support the disaster recovery following the torrential rains in July 2018 returned safely on July 20 (Fri).
- O A debriefing session was held on July 26 (Thu) on the activities of TEC-FORCE members in which the disaster situation in Ozu City and Seiyo City in Ehime Prefecture and the activity status etc. were reported.

#### ■ Debriefing Session on Activities











# Thank you for your kind attention.