

An M6.5 on April 14 (Thursday) at 21:26 hours  
An M7.3 on April 16 (Saturday) at 1:25 AM.

# Two big earthquakes

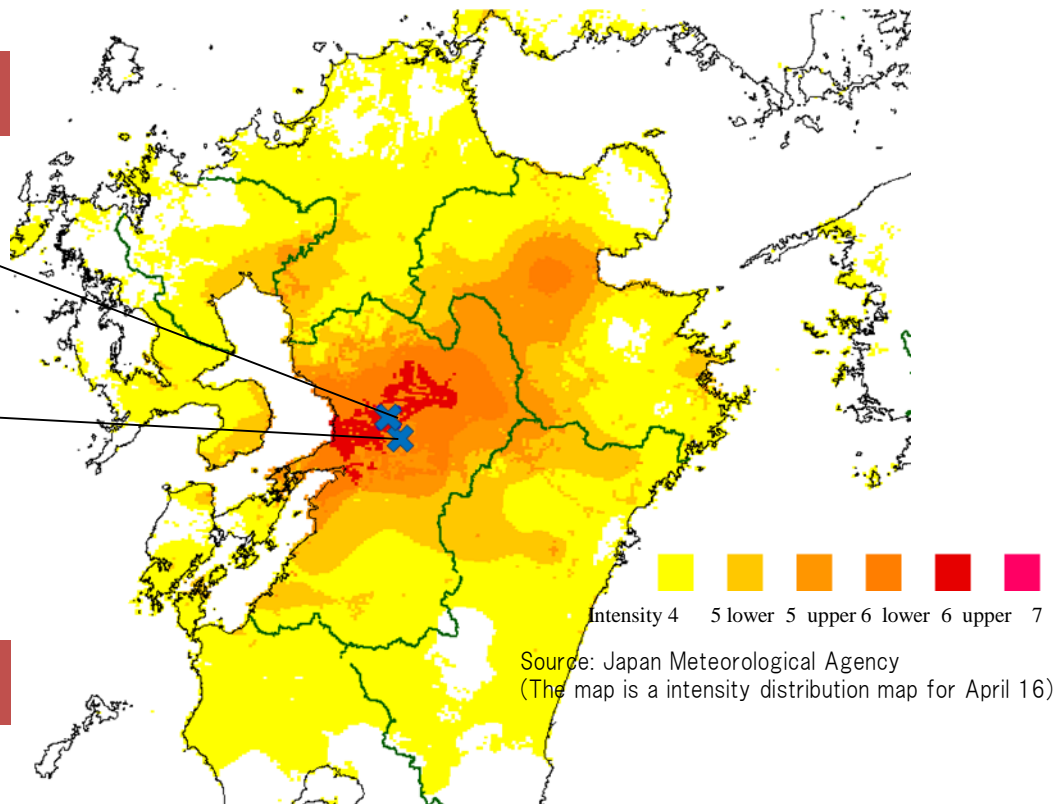
**These two earthquakes were extremely severe, of a recorded strength not previously experienced in the region.**

Also, from April 14 to October 10, a regional total of 4,081 local earthquakes took place respectively at points scattered across wide areas of Kumamoto, Aso, and central Oita. “Earthquake” being defined here as a tremor with an intensity of 1 or more on the Japanese seven-stage seismic scale developed in 1949. Both those two big earthquakes were recorded as having an intensity of 7. No earlier quakes of that general intensity level had occurred in the area since 1949. These two seismic events caused large-scale damage across Kumamoto.

## Intensity distribution map

April 16 1:25 AM  
M7.3 Maximum  
intensity 7

April 14 21:26 PM  
M6.5 Maximum  
intensity 7



## Earthquake overview

Date and time of occurrence	April 14, 2016 (Thurs.) 21:26 (Foresock) April 16, 2016 (Sat.) 1:25 AM (Main Shock)
Epicenter	Kumamoto area Kumamoto prefecture
Scale	Magnitude 6.5 (Foresock) Magnitude 7.3 (Main Shock)
Earthquake name	2016 Kumamoto Earthquake
Main intensities	○Foresock Intensity 7 Mashiki town Intensity 6 lower Tamana city, Nishihara village, Kashima town, Uki city, Kumamoto city ○Main Shock Intensity 7 Nishihara village, Mashiki town Intensity 6 upper Minamiaso village, Kikuchi city, Uto city, Ozu town, Kashima town, Uki city, Koshi city, Kumamoto city

# Aftermath of the catastrophe

Mashiki town (April 23, 2016)

**This pair of earthquakes was unforeseen and caused large-scale damage throughout the Kyushu area.**

Between them, the two big earthquakes plus the immediately consecutive ones caused very extensive damage to several areas, especially Kumamoto city, Mashiki town, Nishihara village, and Minami-Aso village, all of which were near the epicenter. For example, some 190,000 or more houses collapsed, and it was necessary to proclaim several evacuation areas. Around 200 thousand inhabitants had to be evacuated all told.

## The recorded damage figures are:

<b>Fatalities Injured</b>	228 fatalities, 1,149 persons severely injured, and 1,604 less severely injured. (The total since April 14, 2016) Items: <ul style="list-style-type: none"><li>- 50 fatalities confirmed by police through careful investigation.</li><li>- 170 people who died of serious disease and/or injury, due to the severe conditions under which the evacuation had to be carried out. Of this fatality, 167 have been confirmed by local authorities in accordance with the Act for the Payment of Compensation for Disaster or other acts.</li><li>- among those people who died due to damages inflicted between June 19 and 25, 2016, 5 are officially confirmed to have been victims of the Kumamoto Earthquake.</li></ul> (Source: Emergency Response Office, Fire and Disaster Management Agency, as of April 13, 2017)
<b>Damage (house, building)</b>	8,697 houses completely collapsed, 34,037 others half-collapsed, and 155,902 partially but less severely collapsed. 439 public buildings damaged as well as 11,007 other buildings not classified as houses. 15 fires. (Source: Emergency Response Office, Fire and Disaster Management Agency, as of April 13, 2017)
<b>Evacuation</b>	Additionally, as regards evacuation: In Kumamoto prefecture, 855 evacuation points were opened and 183,882 people evacuated. In Oita prefecture, 181 evacuation points were opened and 16,238 people evacuated. (Source: MLIT Kyushu regional development bureau, the above prefectures)



# Damage to the river embankment



Midorikawa river (April 16, 2016)

**The river embankment experienced serious fractures and instances of significant subsidence.**

After the big earthquake, 172 such cases of fracturing or subsidence were observed in the Midorikawa river system, Shirakawa river system, and Kikuchikawa river system. All these three systems are managed by the MLIT. Numerous other cases of such damage were likewise observed in the rivers managed by local authorities. Since the rainy season was imminent, urgent restoration activity was required.



Midorikawa river system Akaigawa river (April 26, 2016)





Minamiaso village (April 16, 2016)

**Large-scale landslides, sand shifts included.  
Around 0.5 million square meters of earth and/or  
sand collapsed instantaneously.**

On April 16, the second large earthquake caused a particularly large landslide, 700m long by 200 wide, in the Aso-ohashi district village of Minami-Aso, in Kumamoto. Numerous other landslides also occurred, especially in the Aso area.



Minamiaso village (April 18, 2016)



# Disruption of land transport arteries

Minamiaso village (May 8, 2016)

**Land transport arteries such as national route 57 and the Houhi rail line were cut.**

In particular, one major landslide cut both national route 57 and the Houhi rail line, either of which is important as a transport link between Kumamoto prefecture and Oita prefecture. Moreover, this same landslide collapsed Aso's big bridge on national route 325. This was the only bridge connecting Kumamoto's city center with the Minami-Aso area. These disruptions made it difficult for emergency vehicles to transport those goods, foods, and other materials which the situation urgently required. As a result, the local populations experienced long delays in returning to normalcy.



Minamiaso village (April 19, 2016)



# Collapsed buildings



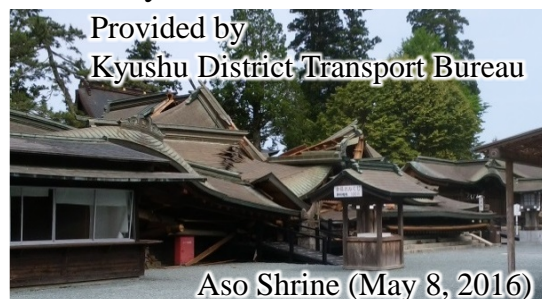
Mashiki town (May 14, 2016)

**A large number of houses, other buildings, and miscellaneous facilities, including an important national cultural property, collapsed.**

Due to the two big earthquakes alone, 8,000 or more houses caved in completely, and 180,000 or more were half-destroyed, or less severely but nonetheless seriously damaged, in the Kumamoto city area, Mashiki town, and Nishihara village. Also, many important national cultural facilities, including Kumamoto Castle and the Aso Shrine, were damaged seriously.



Kumamoto Castle (April 15, 2016)



Provided by  
Kyushu District Transport Bureau

Aso Shrine (May 8, 2016)



Uto city hall (April 19, 2016)



# The Liaison personnel were dispatched to 2 prefectures and 21 cities and towns



Aso city (May 3, 2016)

**The Liaison personnel, who are MLIT staff, provided emergency moral support to local authorities struggling with critical situations in the afflicted areas.**

In French, *liaison* means "the regular exchange of information between groups of people so that each group knows what the other is doing." Liaison personnel were dispatched to emergency centers to deal with disasters affecting local authorities. In this case, the Liaison members gathered information needed to facilitate the recovery and reconstruction of the areas concerned. Between April 14th and the end of May, a total of 2,100 such staff members were sent in this way.



Kashima town (April 19, 2016)



Mashiki town (April 21, 2016)



# Emergency rescue by the sea

Kumamoto Port (April 17, 2016)

## MLIT's ships gathered from several ports all over Japan and conveyed emergency goods and kits to ports near the epicenter.

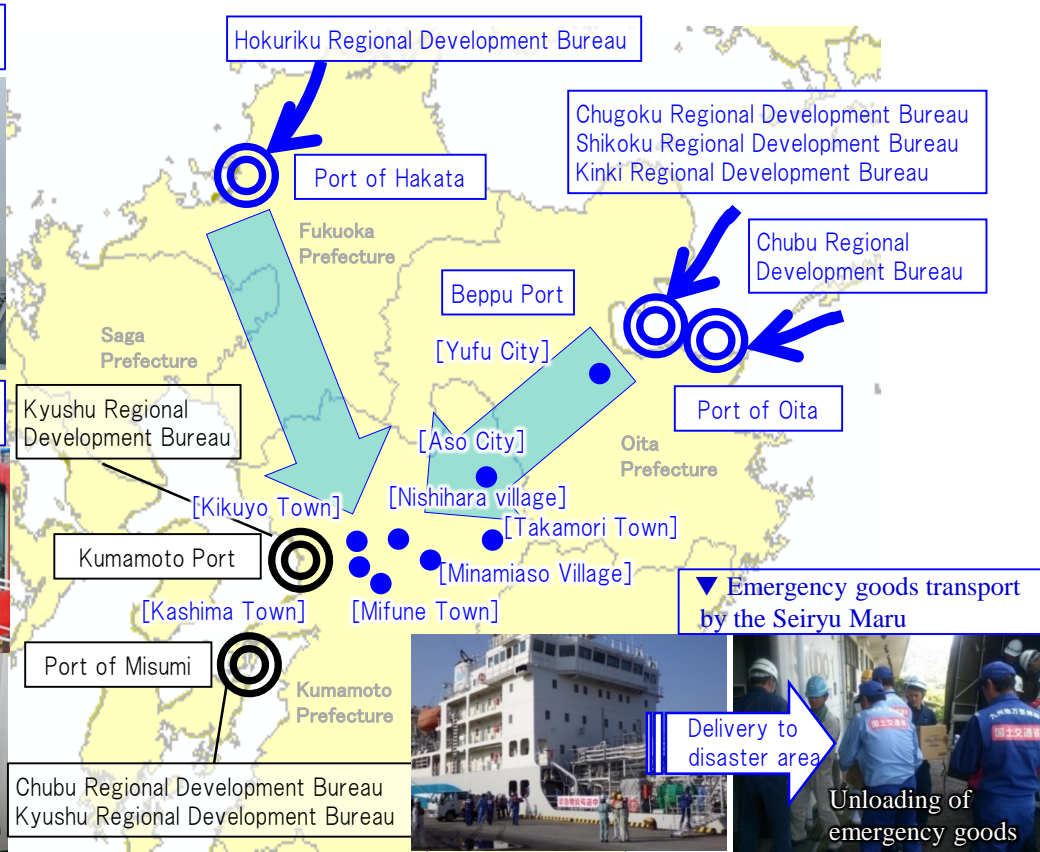
In order to convey necessary goods to the damaged areas promptly, MLIT's ships such as large dredgers and oil-collection vessels were sent to ports in both Oita and Fukuoka. These ships conveyed purified water to evacuees and prepared simple frame baths for them.

### ▼ Emergency goods transport by the Hakusan Maru

The Hakusan Maru, a ship name, Transported emergency goods from Hokuriku areas to the Hakata port, on April 21, 2016.



### ▼ Provision of bathing on the Kaisho Maru





# Road stations, bases for reconstructing the afflicted areas

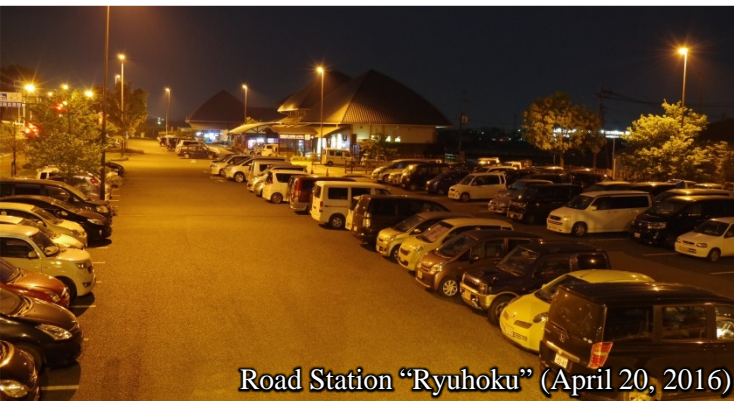


Source) Kyushu Okinawa "Michinoeki" Liason Committee Bureau

Road Station "Oguni" (April 16, 2016)

## Road stations acting as disaster bases received and supported a large number of evacuees.

Road stations near the damaged areas played an important role as disaster centers. For example, they received a large number of the earthquake victims, prepared potable water, distributed hot emergency meals, and delivered construction material for repair of damaged houses. Not least, these centers also provided practicable roads for emergency vehicles' use.



Road Station "Ryuhoku" (April 20, 2016)

Source) Kyushu Okinawa "Michinoeki" Liason Committee Bureau



Distribution of blue tarp distribution  
Road Station "Otsu" (April 20, 2016)



Road Station "Asobonosato Kugino" (April 24, 2016)

Source) Kyushu Okinawa "Michinoeki" Liason Committee Bureau



Road Station "Asobonosato Kugino" (April 22, 2016)



# Disaster investigation from the air



Fukuoka Airport (April 26, 2016)

**Helicopters owned by the MLIT sent real-time pictures, and movies, which constitute information important for prompt reconstruction.**

Just after the big earthquakes occurred, three helicopters owned by the MLIT, the Harukaze, the Airando, and the Hokuriku, took off for the damaged areas in order to gather Information needed for prompt emergency action. They provided important reliable Information to several ministries of the central government and to local authorities as well.



Minamiaso village (May 17, 2016)



Minamiaso village (April 17, 2016)

Inside the helicopter  
"Harukaze" (May 17, 2016)



# Birds-eye views from unmanned aircraft, specifically drones



Minamiaso village (April 20, 2016)

## Drones investigated the damaged areas in detail.

For detailed examination of landslides and of excessive accumulation of either soil or sand, drones normally prove far more effective than do helicopters. Drones equipped with photo cameras and with video-transmission equipment were therefore used to investigate the most heavily damaged areas and record in real time the current situation of actual, or potential, landslide slopes. This type of investigation was mainly focused on the South Aso region due to the especially large number of unstable slopes occurring there. The pictures and movies were provided to the South Aso local authorities as well as to the central government services concerned.



Minamiaso village (April 17, 2016)



# The TEC-FORCE people are dispatched

Minamiaso village (April 22, 2016)

**To assure prompt reconstruction, a total of 8,200 Tec-Force members were mobilized from all over Japan.**

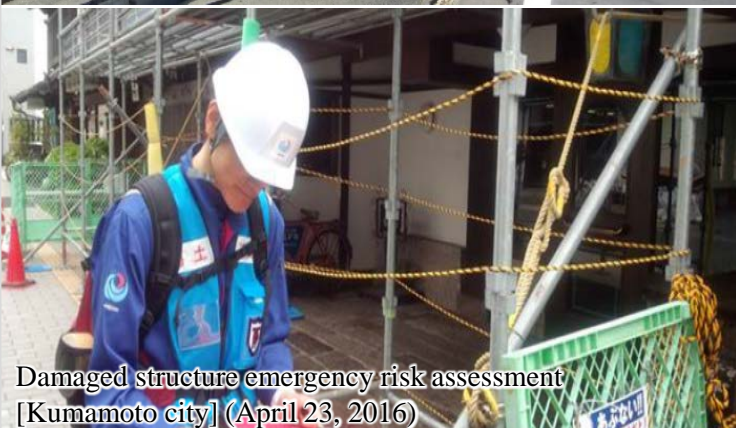
The Tec-Force specializes in emergency response. In the present crisis, 8,200 of these specially trained experts were mobilized from 9 MLIT regional bureaus and from the Cabinet Office's own Okinawa regional agency. Between April 14th and the end of May, all those so mustered were dispatched to the damaged areas to deal with such critical problems as collapsed bridges, cracked river embankments, and actual or threatened landslide situations. Of the total 8,200, between April 14th and 22nd a select group of 440 carried out a special reconnaissance of the areas concerned to determine what action was required.



Road damage survey [Mashiki town] (April 17, 2016)



River deformation survey [Midorikawa river]  
(April 15, 2016)



Damaged structure emergency risk assessment  
[Kumamoto city] (April 23, 2016)



Port facility survey [Kumamoto Port] (April 26, 2016)



# Urgent reopening of critical roads, especially as routes for saving lives.



Restoration completed in 1 week  
(National Route 443 Mashiki town  
Terasako area)

April 20, 2016

## Prompt reconstruction of main roads needed to transport the injured to hospitals and emergency goods to the afflicted areas.

The medical facilities of the Aso campus of Tokai University had to deal with a large number of earthquake victims immediately after the first quake occurred. This required that an emergency route to that campus be opened as soon as possible. This was done in only three days after the first seism struck. Additionally, a major prefectural road, the Gairinzan Otsu line, nicknamed the "Milk Road", was also opened only 4 days after the emergency began. These operations involved detouring relative to a key trunk road, National Route 57. Also reopened promptly were such other roads as National Route 443 and the Takanohara line, aka the "Green Road." Within one week after the crisis began, in fact, almost all main roads were restored to service and being used to help save the lives of evacuees.

Complete road blockage  
due to landslide  
(Milk Road)

April 16, 2016

Restoration complete  
6 days later  
(Milk Road)

April 22, 2016



# Emergency reconstruction through 24 hours of nonstop effort



Construction carried out continuously for 24 hours (Midorikawa river)

May 6, 2016

## Emergency reconstruction of critical river embankment was completed before the rainy and typhoon seasons began.

172 points on the Midorikawa River system, the Shirakawa River system, and the Kikuchi River system were designated as "requiring prompt reconstruction." Among these, the less critically damaged points were dealt with quickly. On the other hand, 11 points were categorized as "severely damaged" and imperatively had to be put right before the rainy season began, to say nothing of the risk from typhoons. The MLIT completed the necessary work by May 9th through 24 hours of nonstop emergency reconstruction carried out in cooperation with private construction firms.



Construction supervision by TEC-FORCE (Midorikawa river)

May 1, 2016



Emergency construction completed (Midorikawa river)

May 9, 2016



# The first step toward restoration of the Aso area



**In order to begin recovery and restoration rapidly, urgent construction works were undertaken to secure major land slope.**

The massive earthquake which occurred on April 16 cut the trunk route from Kumamoto city to the Aso area. As the first step toward rapid recovery and restoration of the damaged section, on May 5 the MLIT began urgent work to reverse and control the resulting erosion. To assure the construction workers' safety, this has been done with heavy unmanned construction machinery.

Transporting construction machinery to the upper part of the Aso mountain area (June 18, 2016)



Carrying out retaining operation and building embankment (June 9, 2016)



The unmanned construction machinery in action (June 11, 2016)



Remote control of the construction machinery



# Connecting several towns in Kumamoto

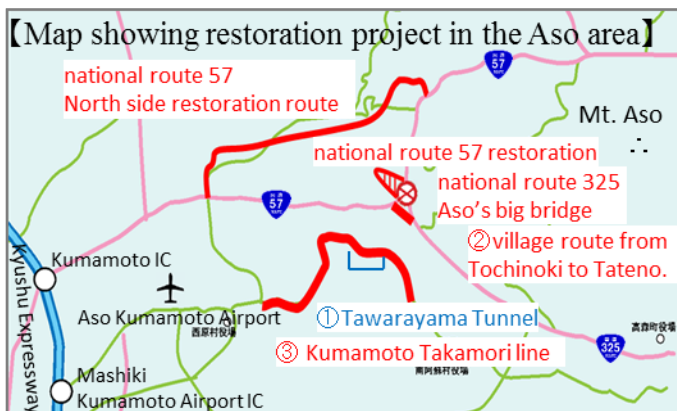
Planned Aso new long bridge

Choyo big bridge

※The photos courtesy of Ohashi, Aso construction

**Starting to restore the trunk roads through use of high-level construction technology in collaboration with academics, public administrators and private industries.**

The MLIT is forwarding several emergency restoration projects on national route 57, which is currently out of service. Similar work is being carried out on the Aso bridge on the national route 325, on prefecture roads, including the Tawarayama Tunnel of the Kumamoto Takamori line, and on the village route from Tochinoki to Tateno.



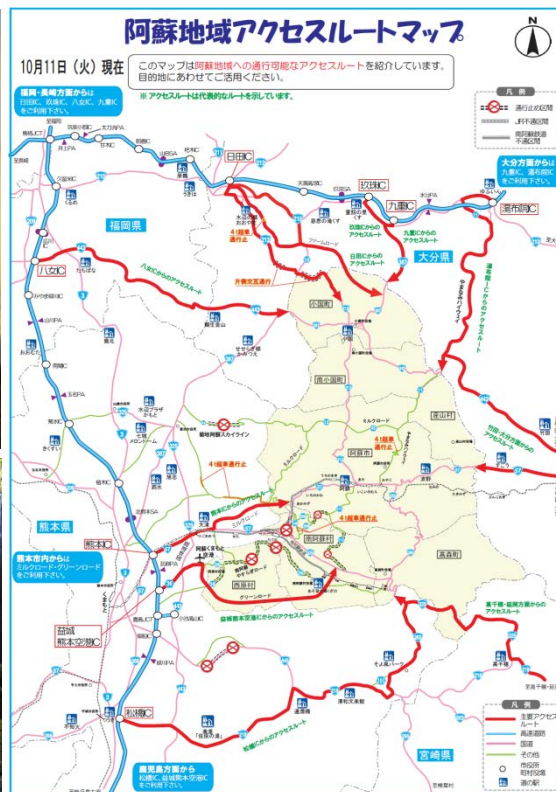


# Let's visit Aso to help revitalize Kumamoto

Mazeno Valley (Oguni Town)

## Aso area access route map to assist tours

The MLIT has created an Aso area route map to show tourists which routes are viable. Please use this map when visiting Aso and proceeding from there to adjacent areas.



Panoramic view of the southern rim  
of volcanic crater

Kusasenri meadow (Aso City)

Thank you! We are doing fine!

Road Station "Aso" (Aso City)



↑ Please from QR cord

Aso area access

Search



Nabegataki Waterfall (Oguni Town)

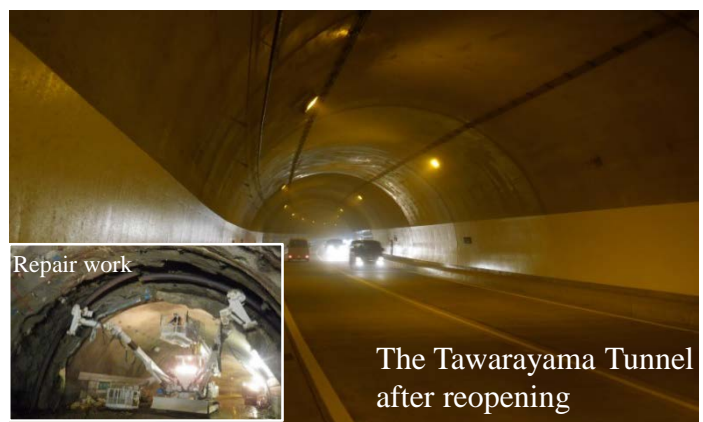
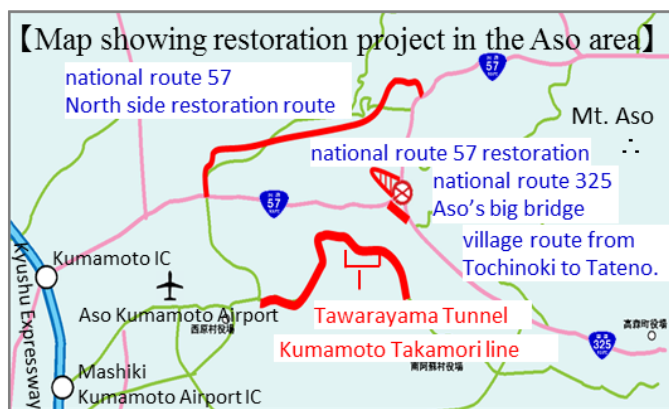


# The Tawarayama Tunnel Reopened



## Revitalization of the regional economy by reopening the Tawarayama Tunnel.

The Tawarayama Tunnel, connecting Nishihara village with Minami-Aso village, was reopened on December 24 (Sat), 2016. This tunnel had been damaged by the Kumamoto earthquake and was closed for repair. MLIT completed the emergency work in only 8 months. The governor of Kumamoto pref., various regional inhabitants and relevant staff members participated in the reopening ceremony and expressed their delight at the recovery.



The Tawarayama Tunnel after reopening



Delivering the reconstructed infrastructure from MLIT to Kumamoto pref.



Local inhabitants enthusiastically celebrating the tunnel's reopening



# Establishment of Safe and Reliable Embankments



Uesugi District on the Midorikawa river (April 4, 2017)

## Full-scale repair work of defective sections of river embankments is on-going.

Based on the work of the Committee for investigating damage in Midorikawa and Shirakawa river area, MLIT determined what damages the earthquake had done to the embankments, decided how to repair them, and made an arrangement to monitor the situation long-term. At present, MLIT is concentrating on repair work for 40 sections on Midorikawa and 12 sections on Shirakawa. The intention is to complete the repair by the end of the rainy season this year.



Uesugi District just after the earthquakes



Investigation of river embankment damage



The Fourth Investigation Committee



Koiwase District on the Midorikawa river



Koiwase District on the Midorikawa river