



PERFORMANCE OF TRANSPORTATIONS SYSTEM IN THE 2016 KUMAMOTO EARTHQUAKE

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Abstract

The April 14 2016 Mw 6.0 (foreshock) and April 16 2016 Mw 7.0 (main shock) earthquakes occurred in Kyushu, the south island, near the City of Kumamoto, Japan. This presentation covers the performance of one of the lifelines – transportations system. Transportations system includes roads, bridges, and railways.

Transportations system.

With the Aso Volcano located on the North-East of Kumamoto, the mountainous terrain makes it necessary to have many bridges within the road system allowing access across rivers and ravines. The same is true for the railway system. The road system is the responsibility of MLIT (Ministry of Land, Infrastructure, Transportation and Tourism). The ministry has its own control system including telecommunication network that manage the traffic signal system, road and traffic emergence services, build and maintenance of the roads and bridges. Roads and bridges were the hardest hit by the main shock of 16 April. Majority of the damage was due to landslides, and surface ruptures. Figure 1 shows the Aso-Ohashi Bridge collapsed by the enormous landslide. Damage to the road system in this area has significant economic impact to the region, as this is a tourist area.

Recovery of major routes was very quick. There are still a number of roads that are being repaired are closed to traffic. However for local residents the ministry provides them with access to their houses (not damaged).



Figure 1. Aso-Ohashi Bridge was damaged by massive landslide

The railway system in Kyushu is mainly operated by Kyushu Railway Company (JR Kyushu) and Nishitetsu Railway. Kyushu Island is link to Honshu (main island) by Kanmon Tunnel and Kanmon Bridge. The island has both Shinkansen and non-Shinkansen railway services. Landslides also impacted railway tracks, as shown in Figure 2. There was a deadheading



Shinkansen derailed right after the April 16 main shock close to Kumamoto Train Station. This is the third time on record that Shinkansen derailed after a high intensity earthquake. The other two times are Kashiwazaki Earthquake 2007 and the Great East Japan Earthquake and Tsunami 2011.

As of the first week of July there are a few railway lines that are not operating yet. The most important one is the tourist train to Aso Volcano. A large part of the train track was dislocated by landslide. For major routes the recovery was quite quick.



Figure 2. Railway track was dislocated by landslide.

Lessons learned.

Developing redundant routes to provide alternate access to community is necessary to reduce undue hardship to residents. The other option is to have an effective emergency response plan that provides speedy recovery or repair to reduce long duration of interruption.

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