

Measures against earthquakes

Measures learned from the past earthquakes

Learning from earthquakes in the past, JR East has employed the following three anti-earthquake measures:

- ① Stopping trains immediately (emergency train stop measures)
- ② Preventing structural damage (seismic reinforcement measures)
- ③ Minimizing secondary accidents following derailment (preventive measures against trains deviating from tracks)

① Stopping trains immediately (emergency train stop measures)

JR East has installed seismographs along coastal and Shinkansen railway lines for the detection of primary tremors (P-waves). Our present system allows us to stop trains as soon as primary tremors are detected. From August 2012, to be prepared for possible occurrences of earthquakes, JR East additionally installed and started using its seismometers at 30 locations for earthquakes with epicenters potentially situated directly beneath the Tokyo metropolitan area and those in inland sections of its service area. In October 2012, JR East began using Earthquake Early Warning from the Japan Meteorological Agency. For conventional lines, our Early Earthquake Alert System was introduced for the Tokyo metropolitan area in December 2007 and in all other areas in April 2009. The system enables trains in any section of track to be stopped in the case of a major earthquake, utilizing information obtained from our Shinkansen seismographs and from any advance announcements given by the Japan Meteorological Agency.

② Preventing structural damage (seismic reinforcement measures)

In response to the 1995 Great Hanshin-Awaji Earthquake, JR East has been taking a number of seismic reinforcement measures. By the end of March 2008, we had reinforced all of our elevated Shinkansen viaduct support columns and Shinkansen bridge columns. On our conventional lines, by the end of March 2009 we had reinforced all other columns in the Southern Kanto and Sendai areas except in places that required additional construction work. Currently, we are reinforcing elevated bridge columns susceptible to failure due to bending by strong earthquake motion, aiming to further improve our safety levels against earthquakes.

From FY2013, to prepare for a possible earthquake directly beneath the Tokyo metropolitan area, we will conduct seismic reinforcement of embankments, cuttings, brick arch viaducts, electrical poles and other infrastructure. In addition, we will implement station/platform ceiling and wall collapse prevention countermeasures, among other initiatives, including advanced plans for the seismic reinforcement of viaduct support columns and bridge columns. Based on experience derived from the Great East Japan Earthquake, we will proceed with the seismic reinforcement of railway station buildings serving more than 3,000 passengers per day, along with the seismic reinforcement of Shinkansen electrical poles.

③ Minimizing secondary accidents following derailment (preventive measures against trains deviating from tracks)

During the Niigata Chuetsu Earthquake in 2004, one of our Joetsu Shinkansen trains was derailed while running. Fortunately, this derailment did not lead to any injury to either our passengers or our train crews. Learning from the events surrounding this earthquake, JR East has taken several measures for our Shinkansen trains and tracks. For our railcars, we have installed an L-shaped car guide on the bogies to restrict lateral movement of the car body. For ground facilities, we are improving the shape of joint bars to lessen the impact of wheels on rail joints in the case of a derailment and implementing countermeasures to prevent the overturning of railcars and the lateral movement of rails if metal rail fasteners are damaged by a derailment.

Nevertheless, during the Great East Japan Earthquake in March 2011, one of our trains in test operation derailed after its regular inspection. Based on the results of the investigations conducted with our Shinkansen railcars and tracks, we will continue to seek further improvement of our safety measures.