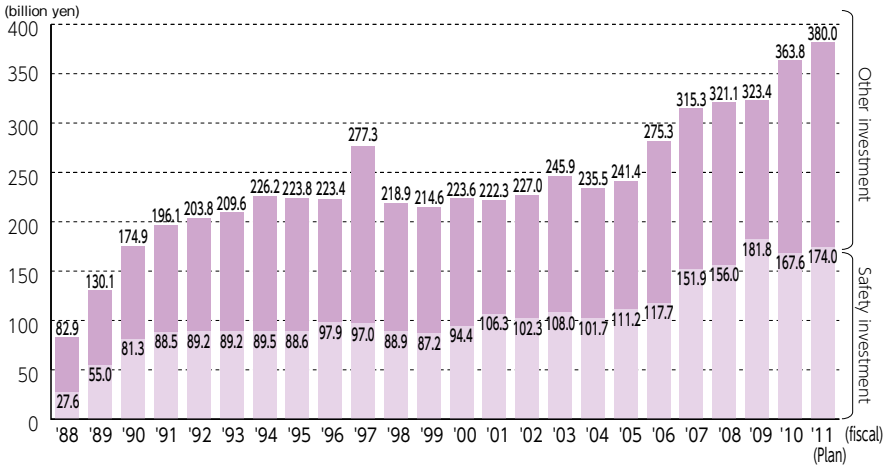
Improvement of safety equipment

Investment in safety equipment for “extreme safety levels”

To achieve a more assured level of safety in railway operations, weak points in the current systems must be identified and reviewed from a safety standpoint. Furthermore, safety equipment must undergo intensive and effective assessments in order to prevent the occurrence of accidents in the future. To date, our countermeasures have been primarily focused on preventing any reoccurrence of accidents that have happened in the past. However, additional risks also exist, such as the very realistic threat of a major earthquake in the Tokyo metropolitan area, which would result in major damage to our railways. As such, in addition to measures we have taken so far, JR East will implement concrete countermeasures through the analysis and evaluation of all potential risks before they actually evolve into accidents.
For improvements to safety equipment, based on our four previous 5-year Safety Plans, JR East has invested more than 2.4 trillion yen since its establishment. In our 2013 Safety Vision, JR East’s 5th 5-year Safety Plan, JR East plans to invest approximately 750 billion yen on safety measures for the 5-year period from April 2009 to March 2014.

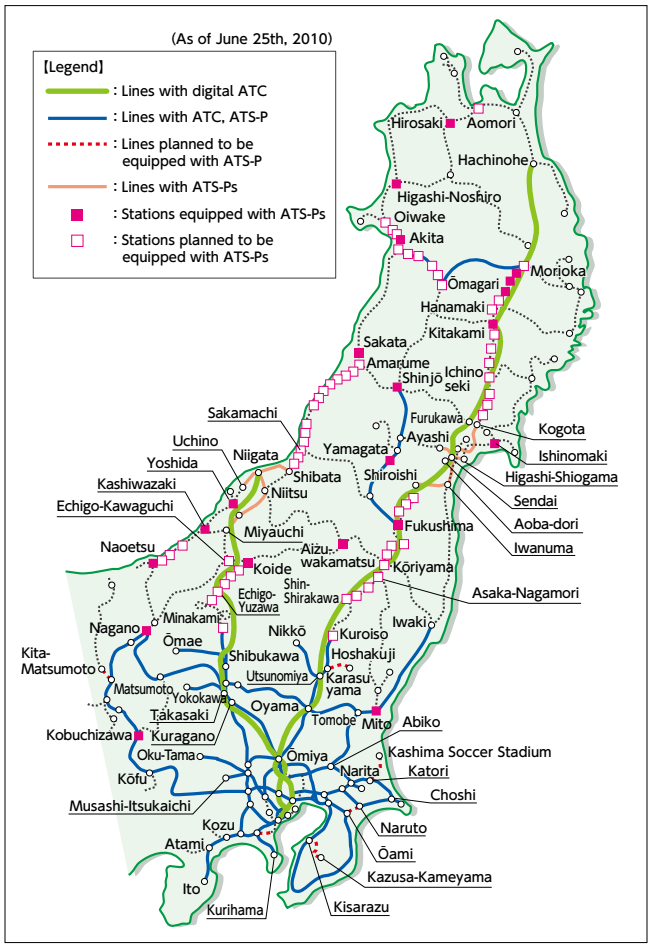
■Trends in safety investment



Installing safety equipment

To prevent collisions between trains, JR East has installed ATS (automatic train stop) and ATC (automatic train control) systems on all of its railway lines. To heighten the current safety level of train operations even further, we are installing ATS-P and ATS-Ps systems, which employ continuous speed monitoring functions. The number of installations is steadily increasing; most new installations are in the Tokyo metropolitan area. By the end of March 2010, the ATS-P system had been installed on 2,321.6 km of railway line. The ATS-Ps system is currently installed on 227.7 km of line in the Sendai and Niigata regions and at 20 stations. In addition, in response to revisions to the Ministry Ordinance for technological standards for railways in July 2006, we are working on measures to prevent excessive train speeds at turnouts, at terminals, and on descending grades. Planned improvements at all curves that had been targeted for action were completed by the end of March 2010.

■Railway lines and stations with ATC, ATS-P and ATS-Ps systems



■Measures to prevent excessive train speeds

	Target locations	Installations as of the end of fiscal March 2009	Planned completion
Curves	1,470 locations	1,470 locations	Fiscal ending March 2010
Turnouts	825 stations	528 stations	Fiscal ending March 2016
Line terminals	63 stations	56 stations	Fiscal ending March 2016
Descending grades	1,528 locations	581 location	Fiscal ending March 2016

* Including locations improved prior to July 2006

Systemization of maintenance work

Safety during maintenance work has been improved with the use of TC-type wireless alarm systems. The systems warn employees working on railway tracks when a train is approaching. JR East has also introduced a safety system that enables workers performing maintenance to turn signals red from a handheld device, ensuring that trains are stopped whenever necessary. The system is already in use on all major lines in the Tokyo metropolitan area and is being introduced to other railway divisions.

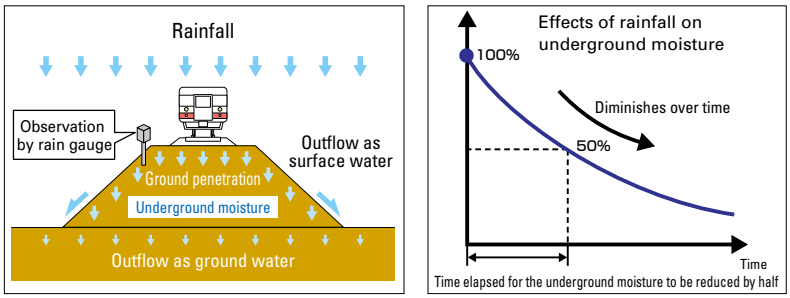
Track closure procedure by a handheld device for maintenance work

Practical application of the Advanced Train Administration and Communications System (ATACS): train control system with radio transmission

ATACS is a train control system utilizing radio transmissions. By using radio communications for the transmission of information between ground and on-board facilities, the system enables the trains to be mainly controlled by on-board equipment. This permits reductions in traditionally required ground facilities such as signals, track circuits, and connecting cables. Eliminating some of these facilities is expected to cause a reduction in the number of transport disruptions.
JR East is aiming to introduce this ATACS to the Senseki Line for practical operation in 2011.

Introduction of effective rainfall as a new index

When there is heavy rainfall, we ensure train safety through operational restrictions such as limits to train speed and, when necessary, by suspension of operations. For operational restrictions on conventional lines, we have been using hourly rainfall*1 and continuous precipitation*2 as our indices. Since June 2008, we have been using “effective rainfall” as a new index that is effective in prevention of landslide disasters due to rainfall. Effective rainfall is the amount of underground water remaining after changes over time in ground penetration and outflow. Using this index, we can more precisely predict the occurrence of landslide disasters, improving the safety and reliability of our train operations.



Use of effective rainfall as an index

*1 Hourly rainfall the total rainfall over a one-hour period
*2 Continuous precipitation the total continuous rainfall over a 12-hour period

Completion of reinforcement work for disaster prevention against heavy rainfall in the Tokyo metropolitan area

JR East has completed its planned reinforcement work to railway lines to protect against heavy rainfall. The measures are intended to reduce operational restrictions due to heavy rain and minimize any effect on train operations. JR East began reinforcement work for disaster prevention against rainfall in April 2004 on 12 routes, mainly in the Tokyo metropolitan area and with high levels of traffic, and this work was completed in June 2008.

Concrete lattice frame protection work

Seismic reinforcement of elevated bridges

In response to the 1995 Great Hanshin-Awaji Earthquake, JR East has been taking a number of seismic reinforcement measures on rigid-frame elevated bridge columns which were susceptible to shear failures. 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 except in places that required additional construction work in the Southern Kanto and Sendai areas. Currently, we are reinforcing elevated bridge columns susceptible to failure due to bending due to strong earthquake motion, aiming to further improve our safety levels against earthquakes.

Early Earthquake Alert System for conventional lines

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. 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.

Prevention of secondary accidents after derailment

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 numerous measures aimed to improve 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 in the case that metallic rail fasteners are damaged in derailment. Furthermore, early detection of earthquake occurrence by seismographs and of interruptions of electric transmission have enabled us to more promptly detect earthquakes and start emergency braking about one second earlier.

Measures to prevent railway crossing accidents

When the company was established in 1987, there were 247 accidents during the year at level crossings. In the fiscal year ending March 2010, the number had been drastically reduced to 43.

Approximately 80% of all level-crossing accidents involve automobiles. We have installed devices such as obstacle detectors, which are capable of detecting an obstacle such as an automobile stalled on a crossing and stopping trains, and we have put crossing warning devices in a higher position for better visibility. More large red and white crossing gates have been installed; the barrier arms are thicker than usual and have red and white reflective plates that cover the whole bar. These are expected to provide better visibility day and night. Studies are currently being carried out on the effectiveness of these bars. In addition, we are presently promoting a wide range of public relations activities for the prevention of level crossing accidents, appealing to drivers for their cooperation and understanding.

Furthermore, we are trying to increase the number of overhead crossings to eliminate level crossings with roads, and are doing this with the cooperation of local governments, neighboring residents, and the police. In addition, for countermeasures against secondary accidents caused by derailments at level crossings, we are installing derailment prevention guards at level crossings.

Station platform safety

In the fiscal year ending March 2010, there were 62 accidents in which customers fell from platforms onto tracks or came into contact with trains. JR East is installing protection-related devices, including emergency train-stopping systems, on our platforms to ensure the safety of its customers. In addition, since customer awareness and cooperation are also vital to safety on our platforms, we are implementing our “Platform safety Campaign” through posters, as a measure to heighten the safety awareness of our customers.

Furthermore, as an additional accident prevention measure for customers on platforms, JR East is introducing automatic platform gates on the Yamanote Line. The gates will initially be installed at Ebisu and Meguro Stations. We will install gates at the remaining stations applying the knowledge earned by analyzing any technical issues and impacts found at the first two stations. We are hoping to introduce the gates to the majority of stations on the line, with the exception of stations requiring large-scale improvement work, by March 2018.

Automatic platform gates on the Yamanote Line