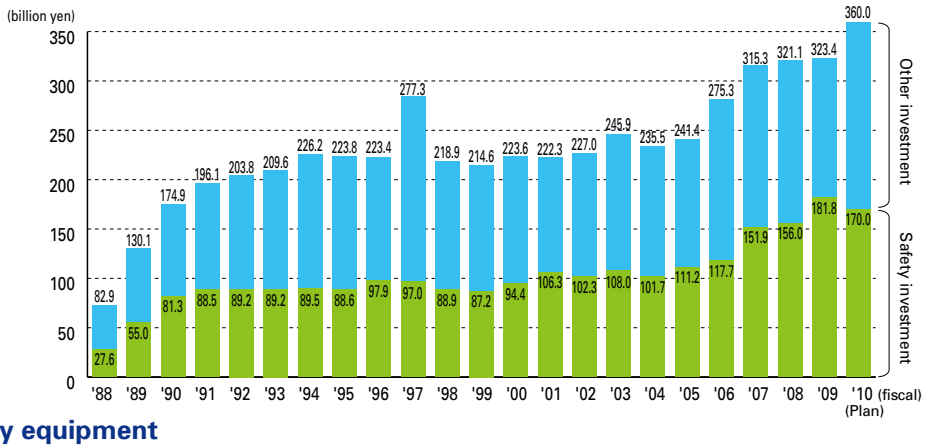
Improvement of safety equipment

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 2.2 trillion yen in the last 20 years. In our 2013 Safety Vision, JR East's new 5-year Safety Plan, JR East plans to invest approximately 750 billion yen on safety measures for the 5-year period spanning 2009 and 2013.

■Trends in safety investment

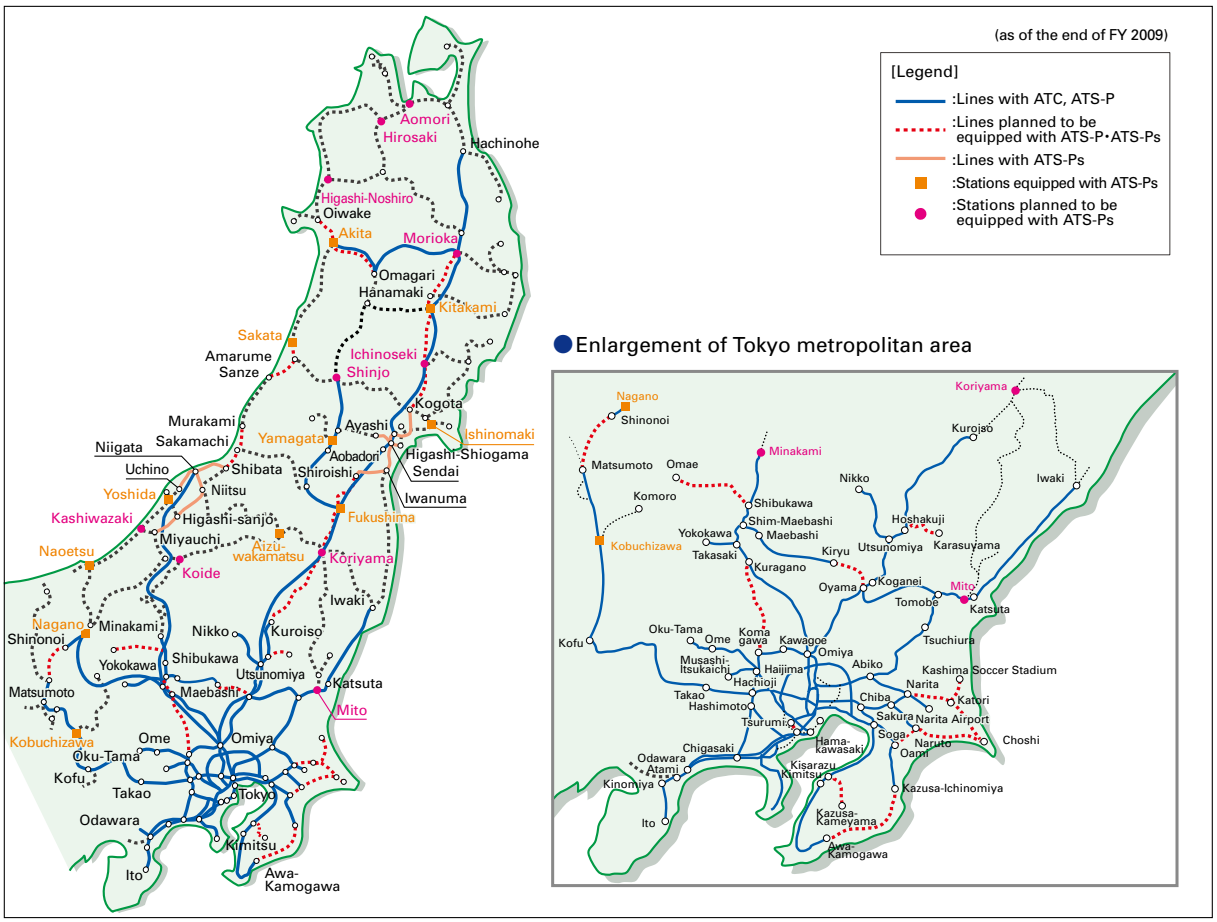


Installing safety equipment

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 2009, the ATS-P system had been installed on 1,942.6 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 11 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 on curves, at turnouts, at terminals, and on descending grades.

—Improvement of safety equipment—

■ 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	1,266 locations	Fiscal ending March 2010
Turnouts	825 stations	452 stations	Fiscal ending March 2016
Line terminals	63 stations	47 stations	Fiscal ending March 2016
Descending grades	1,528 locations	99 location	Fiscal ending March 2016

* Including locations improved prior to July 2006

Systemization of maintenance work

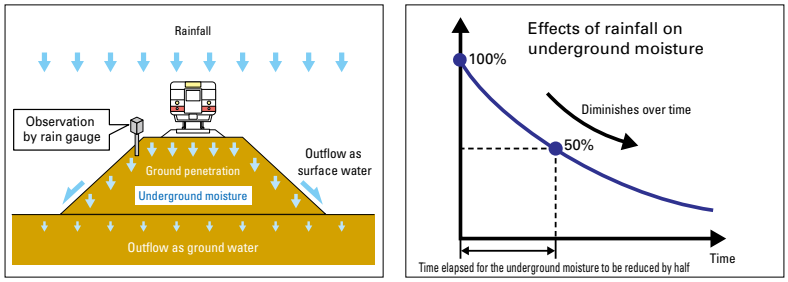
Safety during maintenance work has been improved with the use of TC-type wireless alarm systems. The systems warn employees working on railway tracks when a train is approaching. JR East has also introduced a safety system that enables workers performing maintenance to turn signals red from a handheld 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

—Improvement of safety equipment—

Introduction of "effective rainfall" as a new index

When there is heavy rainfall, we ensure safe train operations through the introduction of operational restrictions such as limits to train speed and the 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, with the work being 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 employed a number of emergency seismic-reinforcement measures on rigid-frame elevated bridge columns susceptible to shear failures. Along with expansion of areas receiving countermeasures, we have also been working on seismic reinforcement to elevated viaduct support columns and bridge columns. By the end of March 2008, we had reinforced approximately 18,500 elevated Shinkansen viaduct support columns and 2,340 Shinkansen bridge columns. For our conventional lines, by the end of March 2009 we had reinforced approximately 12,600 viaduct support columns and 540 bridge columns, not including areas requiring additional construction work.

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.

—Improvement of safety equipment—

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 suppress lateral movement of the car body. For ground facilities, we are improving the shape of joint bars to lesson the impact of wheels on rail joints in the case of a 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 ended March 2009, the number had been drastically reduced to 43. Approximately 60% 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 red and white large 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.

Station platform safety

In fiscal ended March 2009, there were 66 accidents in which customers fell from platforms onto tracks or came into contact with trains. JR East has put a wide range of protection-related devices into place at our platforms to ensure the safety of its customers. These devices include emergency train-stopping systems and image processing devices to detect fallen persons. In addition, our "Platform Safety Campaign" encourages customer awareness and cooperation, both vital for safety on our platforms.

In response to increasing customer expectation and demand for higher levels of platform safety, JR East will introduce automatic platform gates on the Yamanote Line. The gates will initially be installed in Ebisu and Meguro Stations of the Yamanote Line by the end of March 2011 and, after verifying technological issues and the effects on train operations in coordination with other large-scale improvement work, we hope to complete the introduction of these gates to all stations on the Yamanote Line near the end of March 2018.

Automatic platform gates on the Yamanote Line (image)