Pursuing "Extreme Safety Levels"

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Introduction

JR East established its "Management Vision V: Ever Onward" in 2012. That is composed of the two important pillars of "Eternal Mission" and "Pursuing Unlimited Potential," and it puts forth six basic courses. One of those courses is "Pursuing ‘extreme safety levels’—Building a railway capable of withstanding natural disasters," in which safety is positioned as one of the most important management issues, and in that course we are making efforts to improve safety.

The Facilities Department has brought up the following for “Pursuing ‘extreme safety levels’—Building a railway capable of withstanding natural disasters” in its basic policy for fiscal 2013.

(1) Responding to major earthquakes, (2) Responses to natural disasters and extreme weather events, (3) Automatic platform gates, (4) Promoting measures to prevent train collision and derailment accidents, and (5) Upgrading systems and structures to ensure safety. This article will cover the specific efforts of the Facilities Department in pursuing “extreme safety levels.”

Responding to Major Earthquakes

Railway facilities in the area operated by JR East suffered widespread damage in the seismic vibration and tsunami of the 2011 Great East Japan Earthquake. There was not, however, any catastrophic damage such as collapses or destruction of viaducts. This was assumed to be the effect of measures taken in light of past earthquakes. We had conducted seismic reinforcement centering on viaduct columns and station buildings after the 1995 Great Hanshin-Awaji Earthquake. And taking into consideration damage from the 2003 Sanriku-Minami Earthquake and 2004 Mid Niigata Prefecture Earthquake, we conducted seismic reinforcement measures for viaduct columns, piers, tunnels, stationhouses, and other facilities as well as measures to prevent trains from deviating from tracks, and we installed additional seismometers.

However, some bridges and the like for conventional lines where seismic reinforcement had not been conducted were damaged and ceiling materials and the like collapsed at stations. In light of that, construction has been intensively implemented in a five-year plan from fiscal 2012 to build a railway capable of withstanding natural disasters. At a total cost of approximately ¥300 billion, it involves seismic reinforcement measures against a possible earthquake directly beneath the Tokyo metropolitan area as well as expansion of seismic reinforcement measures in Sendai and other areas.

○ Seismic reinforcement of viaduct columns and piers

In seismic reinforcement of viaduct columns and piers, we are working to improve aseismic performance by construction methods such as reinforcing with steel plates. Such seismic reinforcement had already been underway on viaduct columns and piers, but we have moved up plans and expanded the scope of measures to be ready for an earthquake directly beneath the Tokyo metropolitan area and in light of the Great East Japan Earthquake. We are currently conducting reinforcement of flexure-critical viaduct columns where there is risk of damage in strong seismic vibration at locations such as the southern Kanto and Sendai areas. Work is scheduled to be completed on 8,640 Shinkansen viaduct columns by the end of fiscal 2016.
○Seismic reinforcement of embankments near Ochanomizu Station

The Chuo Line embankment near Ochanomizu Station spanning approx. 1.2 km between Shioheibashi and Suidobashi bridges along the Kanda River is located between the Kanda River and a cut slope behind a terrace. Disaster prevention work against rainfall had been done in the past, but work started on seismic reinforcement in July of 2013 to be prepared for an earthquake directly beneath the Tokyo metropolitan area.

Work involves placing reinforcing bars in the ground under the track and integrating them with crib works and existing structures installed on the face of the slope to prevent collapse in a large-scale earthquake. Within the reinforced area, we installed derailment prevention guards on the inside of rails up to fiscal 2012 to prevent trains from derailing. Work is progressing on seismic reinforcement of embankments with a goal of completing that in fiscal 2016.

Responses to Natural Disasters and Extreme Weather Events

In order to respond to natural disasters and extreme weather events, we are working to upgrade facilities in vulnerable sites and upgrade our observation system.

○Measures to thoroughly and continuously reduce damage from natural disasters

With an aim of building a railway capable of withstanding natural disasters, we take measures against slope collapse, rock fall, and scouring in a planned manner every year. In the future, we will considered enhancing disaster prevention in areas where Shinkansen trains run on conventional lines so as to contribute to stable transport.

○Upgrading the observation system for natural disasters

The annual number of incidents of heavy rainfall in excess of 50 mm/h has tended to increase in recent years, and new forms of disasters such as torrential rain in a short period of time have been occurring. For that reason, we have been studying issues such as a new observation system and operation control for extreme weather events.
4 Automatic Platform Gates

In order to prevent incidents such as passengers falling from platforms or coming into contact with moving trains, we have been working to install platform gates and set up tactile tiles for the blind that include direction indicators.

Introduction of automatic platform gates at all stations on the Yamanote Line

Automatic platform gates were installed at Ebisu and Meguro stations in fiscal 2010 in advance of other stations. There we verified technical issues such as sensor settings and timing and speed at which gates open and close. We also verified affects on train operation with an increase in time required for passengers to get on and off trains and response if an accident does occur. In light of the results of that verification, we started using automatic platform gates at Osaki and Ikebukuro stations in fiscal 2012 and we plan to start using them at Otsuka, Sugamo, Komagome, Shin-Okubo, Mejiro, Takadanobaba, and Tamachi stations in fiscal 2013.

We plan to gradually deploy automatic platform gates by fiscal 2015 to a total of 23 stations—all of the stations on the line except those scheduled for large-scale renovation. In addition to the Yamanote Line, we also aim to set up platform gates at places such as stations with heavy use by visually impaired persons upon consultation with concerned agencies.

Installation of tactile tiles for the blind with direction indicators

We are currently working to install tactile tiles for the blind with direction indicators that have bumps to indicate which is the side away from the track. This is done due to a workgroup of the Ministry of Land, Infrastructure and Tourism on promoting installation of automatic platform gates having presented in its mid-term conclusions in 2011 that the tiles should be installed within about five years at stations with 100,000 or more users. JR East plans to install them by the end of fiscal 2015 at stations with use by 100,000 or more passengers a day.

5 Promoting Measures to Prevent Train Collision and Derailment Accidents

Countermeasures for train derailment accidents and level crossing accidents are being made with a goal of eradicating preventable accidents.

Countermeasures in light of the Komachi derailment on the Ou Line

In light of the importance of the March 2013 derailment of a Komachi train on the Ou Line, we set up a committee including JR East experts from various departments to survey the conditions of the derailment and study how to prevent reoccurrence. One countermeasure was to set up snow fences to prevent snowdrifts between Jinguji and Mineyoshikawa so as to secure safe and stable transport by trains in winter. The snow fences are approx. 4 m higher than the surface they are installed on, and they can be folded away in summer. Installation started in August 2013 for approx. 2.3 km between Jinguji and Kariwano and approx. 0.6 km between Kariwano and Mineyoshikawa, and they came into use by the end of the year.

Measures to prevent accidents at level crossings

The number of level crossing accidents at JR East has dropped to less than 20% of the 247 accidents in 1987, the year JR East started, to 34 in fiscal 2012. Level crossing accidents make up a significant percentage of all accidents related to railway operation, so we are taking a number of measures to prevent accidents and improve safety for conventional lines.

As safety measures for level crossings without barriers or warning signals, we have been changing those into crossings equipped with both barriers and warning, with work being carried out in 18 locations in fiscal 2012. We have also set up
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solar-powered warning signs and, at crossings where automobile use is prohibited, traffic barriers. As fundamental measures, we have also been working to eliminate level crossings altogether by means such as converting to grade separated crossings with the cooperation of local governments, residents, police, and the like. We also conduct campaigns to prevent level crossing accidents, which involve activities such as visiting schools located near level crossings without barriers or warning signals.

JR East will continue to make an effort to prevent level crossing accidents in coordination with related entities while cooperating with society in general.

Efforts in safety taken in fiscal 2013 are based on five pillars taking into account “incidents requiring caution” and “major work-related accidents” that occurred in fiscal 2012. Specifically, those are elimination of mistakes in maintenance work, thorough implementation of confirmation dialog, elimination of the three major work-related accidents, identification of and countermeasures against potential work-related potential risks and rare dangers in work that lead to serious incidents, and reorganization of special circumstances of specific areas.

○ Preventing accidents in work under direct control of JR East
In order to prevent mistakes in having workers leave the track when a train is approaching and mistakes in using TC type train approach warning devices, we are working to ensure notice documents and the like are used without fail at each branch. Specific items include location to attach TC type train approach warning devices (wearing safety vests with pockets, etc.), clothing of the train lookout (wearing white gloves, white helmet, armband, etc.), clothing of work foreman (wearing armband and emblem, etc.), methods of implementing work instructions and division of duties instructions (establishing unified rules at each branch), and standardization of rules for roll call before, during and after work and pausing a moment between pointing and verbally confirming.

○ Efforts in safety for construction near tracks
Construction near tracks by outside entities has led to transport disruptions due to incidents such as collapse of scaffolding and heavy machinery falling over. Such scaffolding and heavy machinery obstructing track and colliding with trains could lead to major accidents involving casualties and transport disruptions. We thus created leaflets to explain to those conducting construction near tracks the necessity of advance consultation with the railway operator and the impact of accidents in construction near tracks that lead to obstruction of tracks. The leaflets cover case examples of past accidents, and they are distributed to construction companies and local governments to ask their cooperation in preventing accidents related to construction near tracks.

We also conduct safety patrols, impose severe punishments such as liability claims for those who cause accidents, and work to upgrade efforts in safety. Additionally, the JR East website has guides to give warnings and notices on where to contact for consultation.

Conclusion

Situations surrounding railways are becoming more severe year after year with anticipated large-scale earthquakes, destructive natural disasters and extreme weather events, and the like. To achieve safety for railways, we need to deal with those situational changes and new issues in an appropriate manner. And in that, it is important for each and every employee to think and act on their own, work diligently in day-to-day tasks, and take on the challenge of improving work practices and developing technologies.

Fiscal 2013 was the second year of the group management vision, making it the year to press forward with specific actions. In that year, we have gone forward in making changes in a visible manner.